

Message

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**From:** Cuff, Angie [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=87AD417A3D024A5D93BCA0C31C421787-CLARKE, ANG]  
**Sent:** 1/24/2023 11:53:43 PM  
**To:** molly.cagle@bakerbotts.com  
**CC:** Malone, George [Malone.George@epa.gov]  
**Subject:** General Notice Letter for Union Pacific Railroad Company Houston Wood Preserving Works Superfund Site  
**Attachments:** UPRR GENERAL NOTICE LETTER.docx - 1-24-2023 Final (004)sdw.pdf; 01242023 SOW UPRR RSE Final Draft.pdf

Good afternoon Ms. Molly Cagle,

Please find the attached General Notice and Statement of Work for Union Pacific Railroad Company Houston Wood Preserving Works. A hard copy will be sent to you and C T Corporation System via certified mail. If you have any questions, please contact me via email or use the number listed in the attachment.

Thank you,

Angie Cuff  
Enforcement Officer  
U.S. EPA Region 6  
Superfund and Emergency Management Division (SEDAE)  
1201 Elm Street, Suite 500  
Dallas, Texas, 75270  
214-665-8134

Message

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**From:** Malone, George [Malone.George@epa.gov]  
**Sent:** 2/27/2023 2:16:32 PM  
**To:** molly.cagle@bakerbotts.com  
**CC:** Andrews, Suzanne (she/her/hers) [Andrews.Suzanne@epa.gov]; McGuire, James [McGuire.James@epa.gov]; Meyer, John [Meyer.John@epa.gov]; Price, Lisa [Price.Lisa@epa.gov]; Lockett, Casey [Lockett.Casey@epa.gov]; Cuff, Angie [Cuff.Angie@epa.gov]; kjpeterb@up.com; Nicholas J. Bryan (Njbryan@up.com) [njbryan@up.com]  
**Subject:** FW: UPRR ASAOE Effective Date Notification  
**Attachments:** Final ASAOE JBB Signed EPA Signed 2 24 2023.pdf; SOW UPRR EPA RSE \_Final v3 02142023 (003).pdf



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
REGION 6  
1201 ELM STREET, SUITE 500  
DALLAS, TEXAS 75270-2102

February 27, 2023

Ms. Molly Cagle, Esq,  
Baker Botts L.L.P.  
401 S. 1<sup>st</sup> Street, Suite 1300  
Austin, TX 78704

Ms. Cagle,

The purpose of this communication is to notify you and your client, the Union Pacific Railroad Company, that the final Administrative Settlement Agreement and Order on Consent (ASAOE) for Removal Action Evaluation, CERCLA Docket No. 06-02-23, is effective today. Consistent with Section XXV (Effective Date) of the ASAOE, the ASAOE is effective after EPA issues notice to the Respondent that the Superfund and Emergency Management Division (SEMD) Director has signed the ASAOE. The SEMD Director signed the ASAOE on February 24, 2023. The signed ASAOE and Statement of Work are attached to this email. Should you have any questions or concerns regarding this ASAOE effective date notification, feel free to contact me at your convenience.

/s/ George Malone, III  
George Malone, III, Superfund Branch Manager  
Office of Regional Counsel  
U.S. Environmental Protection Agency, Region 6  
1201 Elm St., Suite 500  
Dallas, TX 75270-2102  
214-665-8030



**BUILDING AMERICA®**

March 3, 2023

***Sent Via: Electronic Mail***

Ms. Casey Luckett Snyder  
Remediation Project Manager  
U.S. Environmental Protection Agency, Region 6  
1201 Elm Street, Suite 500  
Dallas, Texas 75270

**EPA CERCLA Docket No. 06-02-23 – Union Pacific Railroad Company, Houston Wood Preserving Works Site, Houston, Texas  
Project Coordinator Notification**

Dear Ms. Luckett Snyder:

Union Pacific Railroad (UPRR) is providing this letter to serve as the notification of the Project Coordinator for the above referenced Site in accordance with Paragraph 11.a. of the Administrative Settlement Agreement and Order on Consent for Removal Action Site Evaluation (ASAOC) between the United States Environmental Protection Agency (USEPA) and UPRR. I, Kevin Peterburs, Senior Manager of Environmental Site Remediation, will serve as the UPRR project coordinator for all Work and other matters under the ASAOC except for community involvement activities. I have 17 years of environmental consulting experience and have served in my current role at UPRR for over 5 years. I currently manage a remediation portfolio consisting of over 90 projects located in 6 states including Texas. Remediation projects within the portfolio are regulated by both state and federal programs including CERCLA. I oversee a network of resources including environmental consultants and contractors who implement site investigation and remediation activities at our project sites. I have served as the Houston Wood Preserving Works UPRR project manager for the Texas Commission on Environmental Quality (TCEQ) RCRA Post-Closure Care Permit No. HW-50343 since August of 2017.

This letter also serves as the notification to USEPA that Nicholas J. Bryan, Senior General Attorney – Environmental, will serve as the UPRR project coordinator solely with respect to community involvement activities under the ASAOC and SOW. Nick is an environmental attorney with nearly 18 years of experience in both government service (at the Ohio Attorney General's Office) and with UPRR. Throughout that time, he has served as lead counsel on many large sites with both significant environmental and community sensitivity. He has been lead environmental counsel on the Houston Wood Preserving Works UPRR site since September of 2017.



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Should you have any questions or comments, please do not hesitate to contact me at (414) 267-4164. Nick's and my contact information are provided below.

Sincerely,

Mr. Kevin Peterburs  
Senior Manager, Environmental Site Remediation  
Union Pacific Railroad  
4823 N 119<sup>th</sup> Street  
Milwaukee, Wisconsin 53225  
kjpeterb@up.com

Nicholas J. Bryan  
Senior General Attorney - Environmental  
Union Pacific Railroad  
24125 Aldine-Westfield Road, Floor 2  
Spring, Texas 77373  
281-350-7266 (Direct)  
Njbryan@up.com



Message

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**From:** Luckett, Casey [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=5FE6B926DCC04C1CAC2E86900A426CB3-LUCKETT, CASEY]  
**Sent:** 3/6/2023 4:27:28 PM  
**To:** Malone, George [Malone.George@epa.gov]  
**Subject:** FW: CERCLA Docket No. 06-02-23, HWPW, Project Coordinator Letter  
**Attachments:** 3.3.2023 \_ Project Coordinantor Letter, HWPW, CERCLA Docket No. 06-02-23.pdf

**Casey Luckett Snyder**  
**EPA Region 6 Superfund Program**  
**214-665-7393**  
[Luckett.casey@epa.gov](mailto:Luckett.casey@epa.gov)

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**From:** Kevin Peterburs <kjpeterb@up.com>  
**Sent:** Friday, March 3, 2023 2:29 PM  
**To:** Luckett, Casey <Luckett.Casey@epa.gov>  
**Subject:** CERCLA Docket No. 06-02-23, HWPW, Project Coordinator Letter

Hello Casey,

Please find attached the Project Coordinator Letter for the Houston Wood Preserving Works project, CERCLA Docket No. 06-02-23. This notification is being provided as required under Paragraph 11.a of the Administrative Settlement Agreement and Order on Consent for Removal Action Site Evaluation.

Please let me know if you have any questions.

Thanks,  
Kevin



**Kevin Peterburs**

Senior Manager  
Environmental Site Remediation

PHONE: 414-267-4164 | MOBILE: 402-659-1496 | EMAIL: [kjpeterb@up.com](mailto:kjpeterb@up.com)

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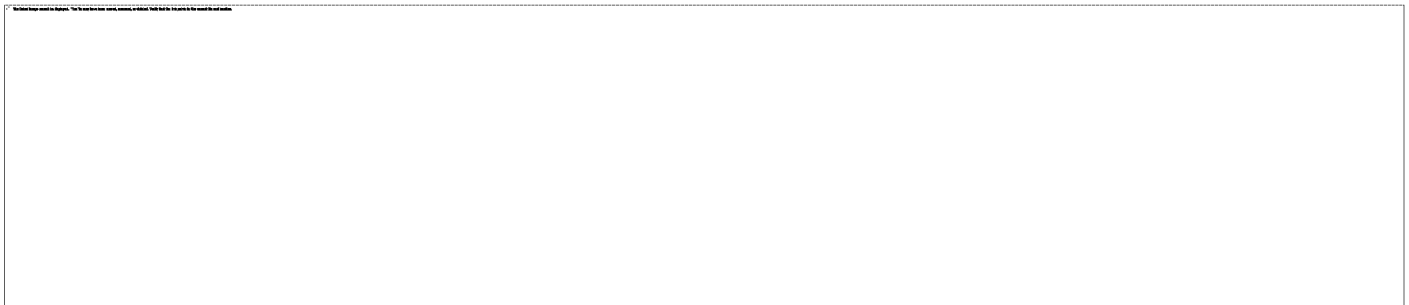
Message

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**From:** Luckett, Casey [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=5FE6B926DCC04C1CAC2E86900A426CB3-LUCKETT, CASEY]  
**Sent:** 2/28/2023 1:47:25 PM  
**To:** Cagle, Molly [molly.cagle@bakerbotts.com]; Seitz, Bart [bart.seitz@bakerbotts.com]  
**CC:** Malone, George [Malone.George@epa.gov]  
**Subject:** US EPA Region 6 News Release - UPRR

Well, it changed a bit after I thought I had the final version. Here it is.  
Casey

**Casey Luckett Snyder**  
**EPA Region 6 Superfund Program**  
**214-665-7393**  
[Luckett.casey@epa.gov](mailto:Luckett.casey@epa.gov)



## **EPA Orders Union Pacific to Assess Contamination in Houston's Greater Fifth Ward Neighborhood**

**DALLAS, TEXAS** (Feb. 27, 2023) — The U.S. Environmental Protection Agency (EPA) announced an Administrative Settlement Agreement and Order on Consent (AOC) with Union Pacific Railroad (UPRR). The consent order compels UPRR to investigate and evaluate potential contamination in and around the former wood preserving facility in the Greater Fifth Ward area of Houston, Texas. UPRR will conduct the investigation and evaluation and EPA will oversee their work. The field work is expected to begin in early Spring 2023.

The AOC includes a statement of work that UPRR must comply with. Authorized under EPA's Comprehensive Environmental Response, Compensation, and Liability Act, the statement of work requires UPRR to conduct several actions, including:

- On- and off-site soil sampling
- Vapor intrusion investigation at potentially affected residences
- Evaluating the off-site storm sewer system for potential contamination associated with the site
- Developing a proposal supporting EPA's community involvement plan for the site
- Conducting a risk evaluation

EPA, the city of Houston, Harris County, and the Texas Commission on Environmental Quality (TCEQ) will use the results of the investigation to inform the next steps for engagement at and around the site. Additional ongoing investigation and cleanup of the UPRR property is being conducted by UPRR under a TCEQ Industrial and Hazardous Waste Permit.

“Houston’s Fifth Ward and Kashmere Gardens neighborhoods have experienced generations of harm. Today’s action represents a major step forward for people living in this area. We intend to use every tool at our disposal for this community,” said **Regional Administrator Dr. Earthea Nance**. “Before any significant cleanup work can be performed, it is essential that we know exactly what we’re facing. We thank the Biden Administration for their commitment towards improving public health and the environment.”

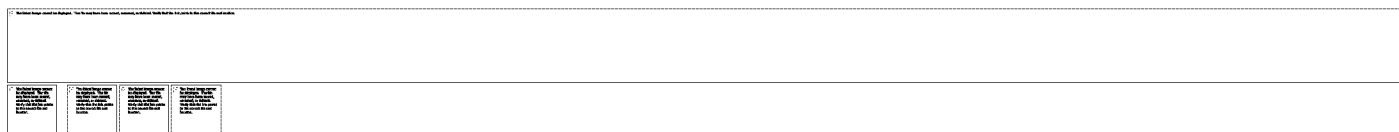
“The city of Houston is committed to advocating on behalf of the people living in Kashmere Gardens who have been and are still being impacted by this site,” said **Houston Mayor Sylvester Turner**. “We welcome and appreciate the EPA's direct involvement and oversight of the actions by UPRR to do what is in the best interests of this community.”

## Background

The Union Pacific Railroad Houston Wood Preserving Works site (UPRR) is just south of the Kashmere Gardens community within the Fifth Ward of Houston, Texas. Formerly owned and operated by Southern Pacific Railroad, the site ceased operating as a wood preserving facility in 1984. It was acquired by UPRR in 1997 through a merger with Southern Pacific. Contamination associated with the former wood treating operations has been identified both on and off-site, including creosote contamination in groundwater. The groundwater investigation and cleanup are being addressed under the TCEQ permit, and groundwater is not used as a drinking water source for the surrounding community.

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Environmental Protection Agency, 1201 Elm Street, Suite 500, Dallas, TX 75270 United States

Message

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**From:** Andrews, Suzanne (she/her/hers) [Andrews.Suzanne@epa.gov]  
**Sent:** 2/24/2023 11:45:50 PM  
**To:** Marvalette.hunter@houstontx.gov; arturo.michel@houstontx.gov; Cagle, Molly [molly.cagle@bakerbotts.com]; Sarah Utley [Sarah.Utley@harriscountytexas.gov]; Mr. James B. Blackburn Jr. [jimbb@suplides.com]; Wilkins, Tim [timothy.wilkins@bracewell.com]; christian.menefee@harriscountytexas.gov  
**CC:** Nance, Earthea [Nance.Earthea@epa.gov]; Dwyer, Stacey [Dwyer.Stacey@epa.gov]; Gonzalez, Iris (she/her/hers) [Gonzalez.Iris@epa.gov]; Meyer, John [Meyer.John@epa.gov]; Price, Lisa [Price.Lisa@epa.gov]; Crossland, Ronnie [Crossland.Ronnie@epa.gov]; Luckett, Casey [Luckett.Casey@epa.gov]; McGuire, James [McGuire.James@epa.gov]; Malone, George [Malone.George@epa.gov]; Acevedo, Janie [Acevedo.Janie@epa.gov]; charmaine.backens@tceq.texas.gov  
**Subject:** UPRR Order  
**Attachments:** Final ASAOC JBB Signed EPA Signed 2 24 2023.pdf; SOW UPRR EPA RSE \_Final v3 02142023 (003).pdf

Attached please find a copy of the signed Administrative Settlement Agreement and Order on Consent for Removal Action Site Evaluation and Statement of Work.

EPA is currently working on a press statement and will not release it earlier than Monday, February 27.

Suzanne Andrews  
Deputy Regional Counsel  
EPA Region 6  
214.665.8027



U.S. ENVIRONMENTAL PROTECTION AGENCY  
**NEWS RELEASE**  
WWW.EPA.GOV/NEWSROOM

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## **Background**

The Union Pacific Railroad Houston Wood Preserving Works site (UPRR) is just south of the Kashmere Gardens community within the Fifth Ward of Houston, Texas. Formerly owned and operated by Southern Pacific Railroad, the site ceased operating as a wood preserving facility in 1984. It was acquired by UPRR in 1997 through a merger with Southern Pacific. Contamination associated with the former wood treating operations has been identified both on and off-site, including creosote contamination in groundwater. The groundwater investigation and cleanup are being addressed under the TCEQ permit, and groundwater is not used as a drinking water source for the surrounding community.

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U.S. ENVIRONMENTAL PROTECTION AGENCY  
**NEWS RELEASE**  
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EPA, the city of Houston, Harris County, and the Texas Commission on Environmental Quality (TCEQ) will use the results of the investigation to inform the next steps for engagement at and around the site. Additional ongoing investigation and cleanup of the UPRR property is being conducted by UPRR under a TCEQ Industrial and Hazardous Waste Permit.

"Today's action represents a major step forward in for people living in Houston's Greater Fifth Ward/ Kashmere Gardens area," said **Regional Administrator Dr. Earthea Nance**. "Before any significant cleanup work can be performed, it is essential that we know exactly what we're facing.

"The city of Houston is committed to advocating on behalf of the people living in Kashmere Gardens who have been and are still being impacted by this site," said **Houston Mayor Sylvester Turner**. "We welcome and appreciate the EPA's direct involvement and oversight of the actions by UPRR to do what is in the best interests of this community."

## Background

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For more information about EPA's work at the UPRR site, please visit [ HYPERLINK

"https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Ffifth-ward-kashmere-gardens-uprr-epa.hub.arcgis.com%2F&data=05%7C01%7Cluckett.casey%40epa.gov%7C84974c3ce3de434ca45608db14f02268%7C88b378b367484867acf976aacbeca6a7%7C0%7C0%7C638126793820922131%7CUnknown%7CTWFpbGZsb3d8eyJWljoIMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikk1haWwiLCJXVCi6Mn0%3D%7C3000%7C%7C%7C&sdata=MSMeRmcDdovuLI8IHEEEoScvUVzQDfzCfWc2u%2Ffx%2Ffx8E%3D&reserved=0"

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**or visit our** [ HYPERLINK "<https://www.epa.gov/aboutepa/epa-region-6-south-central>" ].

###



Message

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**From:** Kevin Peterburs [kjpeterb@up.com]  
**Sent:** 3/3/2023 5:33:01 PM  
**To:** Luckett, Casey [Luckett.Casey@epa.gov]  
**Subject:** CERCLA Docket No. 06-02-23, HWPW, Contractor Letter  
**Attachments:** 3.3.2023 - Contactor Notification Letter - Houston Wood Preserving Works Project - CERCLA Docket No. 06-02-23.pdf  
  
**Flag:** Follow up

Hello Casey,

Please find attached the Contractor Notification letter and attachments for the Houston Wood Preserving Works project, CERCLA Docket No. 06-02-23. This notification is being provided as required under Paragraph 12.a of the Administrative Settlement Agreement and Order on Consent for Removal Action Site Evaluation.

Please let me know if you have any questions.

Thanks,

Kevin



**Kevin Peterburs**

Senior Manager  
Environmental Site Remediation

PHONE: 414-267-4164 | MOBILE: 402-659-1496 | EMAIL: [kjpeterb@up.com](mailto:kjpeterb@up.com)

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**BUILDING AMERICA®**

March 3, 2023

***Sent Via: Electronic Mail***

Ms. Casey Luckett Snyder  
Remediation Project Manager  
U.S. Environmental Protection Agency, Region 6  
1201 Elm Street, Suite 500  
Dallas, Texas 75270

**EPA CERCLA Docket No. 06-02-23 – Union Pacific Railroad Company, Houston Wood Preserving Works Site, Houston, Texas  
Contractor Notifications**

Dear Ms. Luckett Snyder:

Union Pacific Railroad (UPRR) is providing this letter to serve as notification of the Contractors currently retained to perform Work under the Administrative Settlement Agreement and Order on Consent for Removal Action Site Evaluation (ASAOE) between the United States Environmental Protection Agency (USEPA) and UPRR. This notification is being provided as required under Paragraph 12.a of the ASAOE.

UPRR has retained Geosyntec as its general contractor to perform and oversee the ASAOE and SOW-required environmental sampling and testing activities, including specific work involving soil gas and vapor assessment, development and maintenance of a shared analytical database, and other related efforts. David Bertrand is the contractor lead for Geosyntec, and his contact information is: DBertrand@geosyntec.com; 519-514-2233 (work); 519-496-4596 (mobile); 295 Hagey Blvd., Suite 290, Waterloo, Ontario N2L 6R5. Please find enclosed Geosyntec's technical qualification package, which includes David's CV and experience.

UPRR also has retained ToxStrategies, LLC, as a contractor specializing on issues pertaining to dioxins and furans, as well as related toxicological and risk assessment matters. Jon Urban, Ph.D., is the contractor lead for ToxStrategies, and his contact information is: jurban@toxstrategies.com; 512-351-7358 (work); 512-810-1640 (mobile); 9390 Research Blvd., Suite 100, Austin, TX 78759. Please find enclosed ToxStrategies' technical qualification package, which includes Jon's CV and experience.

In addition, UPRR has retained RSJ Consulting LLC as a contractor providing environmental engineering and general consulting support in connection with the ASAOE and SOW activities. Kyle Elliott is the contractor lead for RSJ Consulting, and his contact information is Kyle@RSJconsult.com, 512-965-4190 (mobile); 2407 S. Congress Avenue, Suite E584, Austin, TX 78704. Please find enclosed RSJ Consulting's technical qualification package, which includes Kyle's CV and experience.

By letters dated March 2, 2023, Baker Botts (as counsel for UPRR) provided notice to each of these contractors of their respective responsibilities under Paragraphs 7, 46 and 77 of the ASAOE. UPRR is in



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the process of collecting certificates of insurance from these firms naming USEPA as an additional insured, and will forward these upon receipt.

Should you have any questions or comments, please do not hesitate to contact me at (414) 267-4164. Thank you.

Sincerely,

A handwritten signature in black ink that reads "Kevin Peterburs". The signature is written in a cursive, flowing style.

Mr. Kevin Peterburs  
Senior Manager, Environmental Site Remediation  
Union Pacific Railroad  
4823 N 119<sup>th</sup> Street  
Milwaukee, Wisconsin 53225  
kjpeterb@up.com



# STATEMENT OF QUALIFICATIONS

# COMPANY OVERVIEW

Geosyntec is a consulting and engineering firm that works with private and public sector clients to address new ventures and complex problems involving our environment, natural resources, and civil infrastructure. We serve clients from more than 90 offices in the United States, Canada, the United Kingdom, Ireland, Australia, Sweden, Spain, and the United Arab Emirates.

## RELIABLE INNOVATION

Clients turn to us because we offer best-value, proven services and because we successfully commercialize advanced technologies. We work with universities, industry, and governmental organizations to develop, test, and commercialize new technologies. And we are well-versed at combining long-tested methods with proven innovative elements to create tailored solutions to their most challenging problems.

## SUSTAINABILITY

Geosyntec works to achieve successful social, economic, and environmental outcomes for today and tomorrow. We do this by focusing on our people, our planet, and our business in a sustainable fashion.

## SAFETY

The health and safety of our staff and partners is paramount in everything we do. We establish, enforce, and maintain standards to ensure the physical, psychological, and social safety of our employees, clients, and contractors. In addition, we consult with, listen to, and respond our people to continuously improve the health and safety of all.



## PRACTICE AREAS

- Contaminated Site Assessment and Clean-up
- Infrastructure Planning, Engineering, and Design
- Environmental Planning and Management
- Environmental, Social, and Governance
- Transactional Due Diligence and Consultation
- Water and Natural Resources
- Geotechnical and Geological Analysis, Modelling, and Engineering
- Air Quality Management and Air Pollution Control



## MARKETS WE SERVE

- Aerospace and Electronics
- Agribusiness
- Chemicals and Petrochemicals
- Coastal and Waterfront
- Dams
- Electric Power Utilities
- Energy Transition
- Food and Beverage
- Governments
- Legal Counsel
- Manufacturing
- Mining
- Oil and Gas
- Pharmaceuticals and Biotechnology
- Real Estate, Insurance, and Finance
- Renewable Energy
- Solid and Hazardous Waste Management

# PEOPLE

**30%**

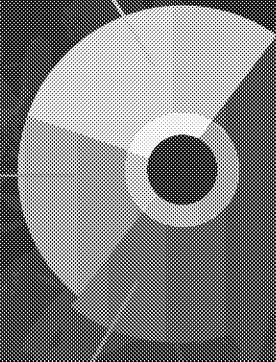
BACHELOR'S DEGREE

**20%**

DOCTORATE DEGREE

**50%**

MASTER'S DEGREE



At Geosyntec, we are more than 1,900 scientists, engineers, and other professionals from around the globe. We work each day to forge an inclusive and equitable environment for all our employees, clients, and partners, and for the communities we serve.



We attract and retain exceptional and diverse people from the top ranks of graduate programs of the world's leading universities. Our best people stay and grow because we offer them interesting projects, as well as the freedom, funding, and time to develop new technologies. This vibrant and collaborative environment is evident in our work products and in our relationships as trusted advisors to academic researchers, colleagues at regulatory agencies, and clients.

With teams that are increasingly span time zones and life experiences, we are learning that each new viewpoint can bring a new idea, skill set, perspective, or opportunity for partnership that increases our ability to innovate and work across sectors, geographies, and cultures.

In addition, Geosyntec is committed to collaborating with socially and economically disadvantaged businesses and with emerging small businesses. Through formal programs, we identify and cultivate enduring relationships with high-quality, innovative, and nimble small-business firms and we mentor minority and small businesses.



Our project experience spans hundreds of initiatives across the environmental remediation spectrum.

Geosyntec practitioners rank among the world's top professionals in providing site assessment and remediation services at a wide range of impacted sites using innovative technologies and solutions that consistently advance the state of the practice.

Through our use of innovative technologies and solutions, we provide our public and private sector clients with a wide array of services to address their toughest challenges.

Our contaminated site practitioners guide our clients through a specialized remediation plan, consult on regulatory strategies, and develop a comprehensive cleanup approach. We can address numerous types of media, including contaminated soils, sediments, and groundwater.

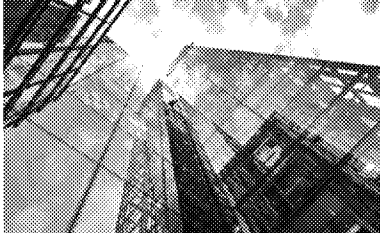
### Advancing the State of the Practice

Geosyntec's practitioners are pioneers in site assessment and remediation. Our senior practitioners have developed and authored guidance material and courses for local, state, and national agencies and associations on remediation techniques and technologies. Working with the Interstate Technical Regulatory Council (ITRC), Geosyntec practitioners taught a training course on vapor intrusion, including mitigation options for the development of vapor-impacted brownfield sites. Geosyntec practitioners also wrote the guidance document on evaluating, optimizing, or ending post-closure care at impacted sites, including brownfield sites, and developed a patented approach for sub-slab vapor migration mitigation allowing residential, commercial, and industrial development on sites impacted by vapor intrusion.

Our specialists routinely collaborate with prominent national researchers from academia and government agencies to provide innovative and defensible strategies for sites with contaminated sediments. For example, we collaborated with the U.S. Geological Survey (USGS) to remediate chlorinated solvent-contaminated marsh sediments by applying a bioreactive mat system embedded with a dehalogenating microbial consortium, a technology that Geosyntec helped develop. This project and partnership earned our client recognition as a finalist for the Service to America Medal awarded by the Partnership for Public Service.

Through a collaborative research project with the University of Florida, Geosyntec professionals assisted in the development of the FLUCL software package for the Florida Department of Environmental Protection. This software is used to calculate exposure point concentration statistics in risk assessment and was the first of its kind to contain algorithms for censored datasets. FLUCL has received endorsements from several U.S. Environmental Protection Agency (EPA) regions and the California EPA.

Geosyntec scientists also pioneered the use of genetic molecular tools for the characterization of the microbes in environmental media and are engaged in applied research and development with top academic institutions around the world, including the University of Toronto, Cornell University, and the Georgia Institute of Technology.



Clients responsible for sites where volatile organic compounds (VOCs) are found in soil or groundwater have discovered that vapors may migrate to the indoor air of overlying and adjacent buildings and result in health and safety risks to their occupants.

Assessing and mitigating the vapor intrusion (VI) pathway can be challenging for these clients because of factors that influence subsurface, building, and atmospheric conditions. It is critical for our clients to get vapor intrusion assessment, and mitigation when required, taken care of correctly the first time due to the risks that poorly conducted efforts potentially pose to human health. Many regulatory agencies have "look-back" contingencies for closed projects (e.g., U.S. EPA 5-year reviews) that allow a site to be reopened to evaluate VI risks at sites previously closed, and if deemed inadequate, can force the responsible party to spend even more money to correct the problem.

Geosyntec has the industry's largest toolbox to effectively evaluate VI potential and allow clients to move past routine sampling with rigorous, defensible data to confirm or rule out VI potential and provide effective mitigation only if required. Our VI practitioners continually lead the industry through applied researching, teaching, authoring peer-reviewed journal articles, and shaping regulatory guidance. When it comes to VI, we have guided the industry for many years - developing the Johnson & Ettinger model, writing U.S. EPA and Interstate Technology & Regulatory Council (ITRC) guidance and ASTM standards, and authoring hundreds of groundbreaking papers and presentations.

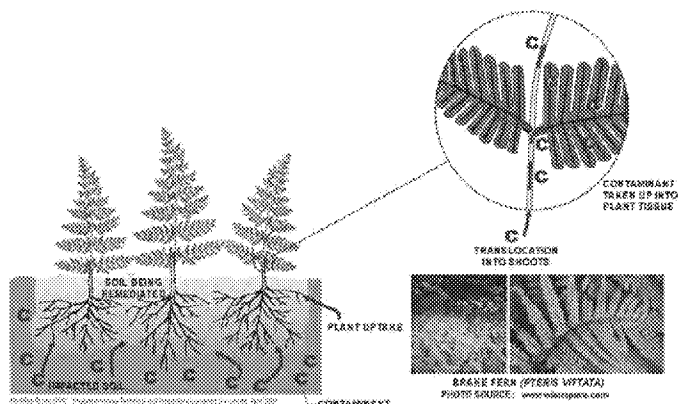
Geosyntec helped develop and were also invited reviewers of many state and industry guidance documents, including New Jersey DEP, California Department of Toxic Substances Control (DTSC), Electric Power Research Institute (EPRI), US Department of Defense (DoD), and many others. With this knowledge and insight, we provide clients with:

- Rapid and clear understanding of site conditions
- Credibility with regulators and stakeholders
- Creative, cost-effective solutions
- Implementing innovative solutions

Geosyntec has more highly experienced VI practitioners than any other consulting firm in the world. We have created a center of excellence that draws the best and brightest minds to provide the best service available. Our staff are geographically distributed throughout our offices, but function as one coherent team within the firm. We will always provide the right person for the job, and we can handle accelerated schedules by increasing project staff allocation better than any other firm.



### Site Assessment and Comprehensive Remedial Strategy using Phytotechnology at a Former Wood Treating Facility and Sawmill



Geosyntec studied the feasibility of using phytotechnology to remediate the residual arsenic contamination in shallow soils at the site.

Location: Bunnell, Florida, USA

Client: Southern Wood Piedmont Company

Project Practice Areas: Contaminated Sites

Type of Facility: Former Wood Treating Facility

Services Provided: Risk-Based Approach for Site Assessment; Site Database and GIS Platform; Greenhouse Study; Conceptual Site Modeling for Offsite Dioxin Transport; Dioxin Fingerprinting

Type of Work: Phytotechnology

Governing Regulation: Federal and Local

The plant site was a former wood treating facility and sawmill that dates back to the 1950's. Wood-treating operations ceased around 1980, and a residential/commercial building material supplier currently uses the facility. Previous work, initiated in 1986, included site assessment and/or corrective action activities (i.e., source removal efforts), which continue to the present. The major contaminants of concern in soils are arsenic and dioxin (expressed as 2,3,7,8-TCDD Toxicity Equivalents), while groundwater below parts of the site is impacted by arsenic. Historically, Pentachlorophenol has been found in groundwater in very isolated areas, but has been naturally attenuated following the source removal efforts. Southern Wood Piedmont (SWP) retained Geosyntec to conduct additional site assessment activities, and to develop a comprehensive remedial strategy to resolve remaining on- and off-site issues. The property was divested in 2006; however, Rayonier is responsible for historic offsite releases.

### Geosyntec's Scope of Services

Geosyntec implemented a risk-based approach that included spatial averaging techniques to develop site-wide exposure point concentrations. This approach can lead to risk reductions by addressing selected remaining hot spot areas without having to remediate every pocket of residual contamination above a soil cleanup target level. Geosyntec managed the site database and used a GIS platform to present the data and to assist in data evaluations. As part of a comprehensive remedial strategy, we conducted a greenhouse study in conjunction with Edenspace Corporation to evaluate the feasibility of a phytotechnology approach to remediate the residual arsenic contamination in shallow soils at the site. The greenhouse study focused on using a recently-discovered brake fern (*Pteris vittata*), which has been shown to hyperaccumulate arsenic in its shoots to concentrations as high as 22,000 mg/kg. Study results have indicated that soil arsenic concentrations at the site can be reduced by at least 10 mg/kg on an annual basis. However, after divestiture, the new property owner is responsible for onsite issues. A second application of phytotechnologies at the site is the use of a slash pine plantation to hydraulically control the migration of arsenic-impacted groundwater. We recently installed the system and associated wells and piezometers to monitor its performance.

Since industrial operations have ceased, contaminated soils have been excavated, and the core of the arsenic plume will be hydraulically contained, while currently-elevated levels of arsenic in groundwater are expected to naturally attenuate due to dilution, adsorption, and precipitation as arsenic sulfides. With respect to offsite releases, Geosyntec developed a conceptual site model for the offsite transport of dioxins and is using the CSM to limit the scope of the dioxin investigations. The CSM included a Principal Component analysis and source modeling to fingerprint the background dioxins which was used to delineate the extent of the release contributed by the Plant. Geosyntec also worked with the property owner and developed a site-specific cleanup goal for dioxins (490 ppt) that will be protective of future industrial workers.

## **Notable Accomplishments**

Geosyntec's dioxin fingerprinting and CSM are being used to limit the scope of the dioxin investigation. Our geochemical evaluation of shallow groundwater revealed that conditions are conducive to the precipitation of arsenic sulfides, and groundwater concentrations have already decreased substantially since the last comprehensive groundwater assessment.



#### Specialties

- ✓ Experienced leader at Brownfield Sites.
- ✓ Experienced leader of large multi-disciplinary engineering and professional teams.
- ✓ Recognized leader of design and application of innovative remediation technologies.
- ✓ Remedial Action Plans
- ✓ Cost estimating and strategic planning
- ✓ Communication with Project Stakeholders

#### Education

B.Sc., Earth Science, University of Waterloo, Hydrogeology Specialization, 2000

#### Registrations

Professional Geoscientist in the Province of Ontario (#1559)

Professional Geologist in the State of New York (#001103)

#### CAREER SUMMARY

Mr. Bertrand is a Senior Principal at Geosyntec. He is a hydrogeologist with over 23 years of experience in environmental consulting, brownfield redevelopment, waterfront revitalization, investigation, and remediation of sites with recalcitrant contaminants, and vapour intrusion assessment and mitigation. David has directed and managed many interdisciplinary projects, including brownfield redevelopment (O.Reg. 153/04), design and installation of risk management measures, environmental site assessment (ESA), and remediation of sites with recalcitrant contaminants. He has directed and managed remediation projects using self-sustaining treatment for active remediation (STAR) technology; multiphase extraction and enhanced bioremediation of dense nonaqueous-phase liquids (DNAPLs); in situ thermal remediation; alternative approaches for in situ bioremediation of perchlorate; phytoremediation; and excavation of soils containing chlorinated solvents, mercury, and petroleum hydrocarbons.

#### KEY PROJECT EXPERIENCE

**Queen's Quay East Extension, Queen's Quay West Pilot Program, and Quayside Area Redevelopments, Waterfront Toronto, Toronto, Ontario.** Project Director for a dynamic, multidisciplinary investigation program supporting the redevelopment of underused lands along Toronto's shorefront. The program included geotechnical and environmental investigations across several private properties and public roadways and within Lake Ontario. In addition, complex Phase One and Two ESAs were complete to support Record of Site Condition (RSC) filings for three separate properties. Other project tasks included developing remedial strategies, conducting continuous water levels monitoring, evaluating sediment quality, and reviewing lake in-filling dredging and risk management options.

**Port Lands Flood Protection and Enabling Infrastructure (PFLP) Project, Michael Van Valkenburgh Associates (MVVA), Toronto, Ontario.** Project Director, Lead Geoscientist and Qualified Person for the Water Lot Design/Build and the River Excavation design teams. In this role, David provided leadership, technical and regulatory support to the team of over 100 engineers and professionals responsible for designing a complex excavation support system (i.e., secant piles) that double as a risk management measure in conjunction with a horizontal barrier system. He is responsible for the overall quality of Geosyntec's services and meeting with Waterfront Toronto and MVVA.

**Pilot Test for the Treatment of Soils using Smoldering Combustion, Waterfront Toronto, Toronto Ontario.** Project Director for applying innovative remediation technology in the Port Lands. In situ STAR and ex situ STARx pilot tests were conducted in the Port Lands to demonstrate that the petroleum-hydrocarbon-impacted soils could undergo smoldering combustion in a self-sustaining manner and to evaluate the potential to apply this technology at full-scale for treatment of impacted soils in the proposed new river valley and surrounding area.

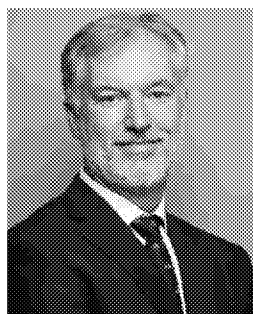
**Investigation and Remediation at Former Manufacturing Facility, Confidential Client, Toronto, Ontario.** Project Director and QP<sub>ESA</sub> brownfield redevelopment site. Tasks performed included ESA, risk assessment (RA), and implementation of in situ thermal remediation (ISTR) to reduce chlorinated volatile organic compound (CVOC) concentrations in the soil and groundwater. ISTR was being completed over an area of approximately 1,600 square meters and was composed of 122 heater wells, 57 vertical extraction wells, horizontal extraction wells, and temperature and pressure monitoring points. All investigation and remediation activities were completed to support filing an RSC

(O.Reg.153/04). The RA was acknowledged by the MECP on May 22, 2022.

**Investigation and Remediation at Former Manufacturing Facility, Schneider Electric Systems Canada Inc., Belleville, Ontario.** Project Director and QP<sub>ESA</sub> for a brownfield redevelopment site (O.Reg.153/04). Tasks performed included ESA, RA, design of risk management measures, off-site vapor intrusion assessment and mitigation, MECP negotiation, and operation of a soil vapor extraction (SVE) system to remove VOCs from the unsaturated bedrock. All investigation and remediation activities are being completed to support filing of an RSC. RSC filing is anticipated in 2022.

## REPRESENTATIVE PUBLICATIONS

- 21-01 **Bertrand, D.**, Forbes, D., Cumberland, H. 2021. Waterfront Toronto – Waterfront Toronto - Risk Management Measures for the New River Valley. Platform presentation at 2020 SMART Remediation Conference, February.
- 20-01 **Bertrand, D.**, Forbes, D., Cumberland, H. 2020. Waterfront Toronto – Waterfront Toronto - Risk Management Measures for the New River Valley. Platform presentation at 2020 SMART Remediation Conference, January 23.
- 19-01 **Bertrand, D.**, Janes, M, Forbes, D., Cumberland, H. 2019. Waterfront Toronto – Risk Management Measures of the New River Valley. Platform presentation at 2019 Remediation Technologies Symposium, October 17.
- 16-01 **Bertrand, D.M.**, McAlary, T.A., Barros, N., Wanty, D., and Sylvester, M. 2016. An Integrated Approach to Vapor Intrusion Assessment at a Shallow Fractured Bedrock Site Adjacent to Residential Properties. Platform presentation at 10th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, California, May 25.
- 16-02 McAlary, T., **Bertrand, D.**, Nicholson, P., Wertz, W. and Mali, D. 2016. High-Volume Sampling (HVS) for Subslab Vapor Characterization: Compilation and Statistical Analysis of > 100 Tests. Poster presentation at 10th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, California, May 23.
- 13-01 **Bertrand, D.**, McAlary, T.A. et. Al., 2013. Development of More Cost-Effective Methods for Long-Term Monitoring of Soil Vapor Intrusion to Indoor Air Using Quantitative Passive Diffusive-Adsorptive Sampling Techniques. Platform Presentation at the Electric Power Research Institute (EPRI) Manufactured Gas Plant (MGP) Symposium, Savannah, Georgia, November 13.
- 10-01 McAlary, T.A., Nicholson, P., Yik, L.K., **Bertrand, D.** and Thrupp, G., 2010. High Purge Volume Sampling - A New Paradigm for Sub-Slab Soil Gas Monitoring, *Groundwater Monitoring and Remediation* 30, no. 2, p. 73–85.
- 10-02 **Bertrand, D.**, H. Groenevelt, J. Lanzon, W. Bingham and T. McAlary, 2010. Passive (Wind-Driven) Systems for Sub-slab Venting to Mitigate Potential Vapor Intrusion. Platform presentation and proceedings paper in Proceedings of the 7th Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, CA, May 25.
- 09-01 McAlary, T.A., Nicholson, P., Groenevelt, H., **Bertrand, D.**, 2009. A Case Study of Soil-Gas Sampling in Silt and Clay-Rich (Low-Permeability) Soils, *Groundwater Monitoring and Remediation*, March 2009, Volume 29, Issue 1, p 144–152.



#### Specialties

- ✓ Indoor Air and Vapour Intrusion Expert
- ✓ Risk Communication and Communication with Stakeholders
- ✓ Contaminant Transport Modelling
- ✓ Technical Input for Claim Evaluation and Dispute Resolution
- ✓ Contributing author and editor to vapour intrusion or soil gas sampling guidance documents adopted by regulatory agencies

#### Education

University of Waterloo: Doctorate (Ph.D.), Chemistry, 2014

University of Waterloo: Master of Science (M.Sc.), Earth Sciences Hydrogeology, 1989

University of Waterloo: Bachelor of Applied Science (B.A.Sc.), Geological Engineering, 1986

#### Registrations and Certifications

Professional Engineer, Ontario (90467689), British Columbia (40414)

#### Positions in Academia

Adjunct Professor, Chemical Engineering & Applied Chemistry  
University of Toronto, 2014-present

## CAREER SUMMARY

Dr. McAlary is an expert in the evaluation of contaminant fate and transport in groundwater and the vadose zone. He has over 30 years of consulting experience on environmental investigation and remediation projects. He is especially experienced with the migration of volatile organic compound (VOC) vapours originating beneath and around buildings and the assessment of inhalation exposures from subsurface vapour intrusion to indoor air. He conducted his first assessment of vapour intrusion beginning in 1992 and has been the Technical Director of one of the world's largest studies of vapour intrusion since 1997. He was invited by the USEPA in 2000 to participate in the development of the RCRA Supplemental Environmental Indicator Guidance on vapour intrusion and was one of the 3 primary co-authors (2001). He was the primary author for the Electric Power Research Institute's (EPRI's) Vapour Intrusion Reference Handbook, and a contributing author or editor to vapour intrusion or soil gas sampling guidance documents prepared by the Interstate Technical and Regulatory Council (ITRC), The US Navy, Atlantic Provinces Partnership for RBCA Implementation (PIRI), Health Canada, Ontario MOE, and the UK Energy Institute. He was the principal investigator for several applied research programs, including ESTCP ER200830 (Passive Samplers), ESTCP ER201322 (Vapour Intrusion Mitigation Optimization), AFCEC BAA (Comparison of Multi-Increment Sampling to High Volume Sampling), and a key team member for ESTCP ER201503 (Mass Flux Monitoring). He is also the primary patent holder for U.S. Patent No. 10,060,259 B2 (Quantitative Passive Soil Vapour Sampling).

Dr. McAlary is also an Adjunct Professor at the University of Toronto and has taught up to three undergraduate Chemical Engineering courses per year for over 16 years.

## KEY PROJECT EXPERIENCE

*Investigation and Remediation of Mercury and Chlorinated Solvents, Former Battery Manufacturing Facility, Mississauga, Ontario.* Dr. McAlary was the Project Director for a site-wide assessment and remediation of elemental mercury and solvents in soil and groundwater beneath a former manufacturing facility, including 6 months of excavations through the floor of the building with workers all in Level B (supplied air) personal protective equipment, implementation of a subslab depressurization system and development of a phytoremediation containment system to prevent off-site migration of chemicals in groundwater.

*Vapour Intrusion Assessment and Risk Assessment, Edwards Air Force Base, California.* Dr. McAlary was the Technical Director and Project Manager of a base-wide assessment of vapour intrusion at Edwards AFB from 2013 to 2017 for the U.S. Air Force. The regulatory agencies included the U.S. EPA Region IX, the California EPA Department of Toxic Substances Control and the California Regional Water Quality Control Board, and their initial expectations were sub-slab and indoor

air samples from multiple locations in two seasonal events for all 1200 buildings at the base. Dr. McAlary was able to negotiate a phased approach focusing initially on a dozen buildings with the highest likelihood of vapour intrusion risks based on proximity to elevated concentrations of VOCs in the subsurface. The study included a screening component conducted with portable instruments to identify the location in any given building with the greatest potential for vapour

intrusion based on sub-slab VOC concentrations, passive indoor air and sub-slab sampling for long-term time-weighted average concentrations, 24-hour Summa canisters in select locations for Level 4 data quality needed for risk assessment and cross-slab pressure differential to characterize whether the indoor air samples were representative. The results showed that only one of the buildings had a potentially unacceptable risk, although the frequency of occupancy was low enough that an administrative control was sufficient to achieve a condition of no significant risk. Based on this outcome, the other buildings at the base would not be expected to have vapour intrusion risks, resulting in considerable savings for the Air Force.

*Vapour Intrusion Assessment and Management, Confidential Client, England.* Dr. McAlary was the Technical Director from 1997 to 2015 of one of the largest investigations of subsurface vapour intrusion to indoor air in the world adjacent to two former sandstone quarries subsequently used for waste disposal by a chlorinated solvent production facility. The study consisted of several events of indoor air sampling and analysis at 145 properties, soil gas sampling and analysis from over a dozen events at 48 vapour monitoring wells, and was supplemented by over 300 samples of outdoor air quality, subsurface pneumatic testing, borehole and surface geophysics, building pressure and ventilation testing, applied research into phase partitioning in the unsaturated zone, statistical analysis, mathematical modeling, remedial alternatives development and cost-benefit analysis, public meetings, litigation support, and regulatory meetings. The results showed the only buildings with vapour intrusion risks were located on quarry spoil materials that were highly permeable and devoid of the mudstone layers native to the sandstone bedrock through the rest of the study area.

*Vapour Intrusion Assessment, Regulatory Negotiation and Litigation Support, Chevron, Hooven, Ohio.* Dr. McAlary was the Technical Expert for a Site-Specific Assessment of subsurface vapour fate and transport in support of a Human Health Risk Assessment in a residential community adjacent to a former refinery in Ohio, responsible for developing protocols and work plans, training field sampling personnel for the collection of ~300 soil gas samples over a period of a few months with multi-depth nested probes, near-slab and sub-slab sampling, regulatory negotiation and support for public meetings. The results showed that the hydrocarbon vapours degraded by aerobic metabolism mediated by naturally occurring microbes. Several rounds of soil vapour sampling from nested probes at 1.5 m intervals from ground surface to 20 m depth combined with mathematical modeling using first order degradation kinetics provided substantial support for the conclusion of no significant risk in any of the residences.

*Vapour Intrusion Assessment and Regulatory Negotiation, Anadarko Petroleum Corporation, Enid, Oklahoma.* Dr. McAlary was the Project Manager and Technical Director for a Site-Specific Assessment of subsurface vapour fate and transport in residential and institutional areas adjacent to a former refinery in Oklahoma, responsible for regulatory negotiation, workplan development, protocol development, implementation of a sampling program consisting of vertical profiles of soil vapour at 6, 9 and 12 feet below ground in 43 locations during wet and dry seasons, implementing a data quality program designed to provide unassailable data quality. The results showed no significant risk, and the regulatory agency accepted the results unconditionally.

*Vapour Intrusion Assessment and Mitigation, Confidential Client, Bridgewater, New Jersey.* Dr. McAlary was the Project Director for an assessment of subsurface vapour intrusion in a residential community adjacent to a former manufacturing facility in New Jersey, consisting of a multi-stage investigation of shallow groundwater, soil gas, sub-slab soil gas, indoor air and outdoor air, along with pneumatic testing, installation of sub-slab venting systems, in both commercial and residential buildings, verification testing and regulatory negotiation. The mitigation systems have been operating effectively for over a decade.

*U.S. EPA Expert Panel on Vapour Intrusion.* Dr. McAlary has been a member of the U.S. EPA Expert Panel on Vapour Intrusion since 2000, under contract through RTI International, Inc. His duties included co-authoring responses to comment of the 2002 draft OSWER Vapour Intrusion guidance, technical presentations on the state of the art in vapour intrusion at the U.S. EPA Workshops during the AEHS West Coast Conference each year from 2004 through 2017, and coordination of a soil gas sampling hands-on demonstration at the Midwestern States Risk Assessment Symposium in 2006. He also participated in over 100 conference calls discussing planning for these events and revisions to U.S. EPA policies and guidance.



#### Specialties

- ✓ Quality Assurance Manager
- ✓ QA Field and Laboratory Auditing
- ✓ Environmental Biotechnology
- ✓ Analytical Data Specialist
- ✓ Site Analytical Data Evaluation and Valuation
- ✓ Office Management

#### Education

M.B.A., Quality Management,  
Upper Iowa University, 2009

M.A., Organizational Management,  
Tusculum College, 2002

B.A., Biology, Lock Haven  
University, 1980

#### Registrations and Certifications

ASQ Certified Quality Manager,  
#13876

Certified Environmental Field  
Sampler, #0414

Certified Radiochemistry Data  
Validator, Radiochemistry Society

NQA-1 Lead Auditor

## CAREER SUMMARY

Ms. Caprio is a Senior Principal specializing in quality assurance (QA) as the Geosyntec Operational Quality Manager. She has over 30 years of experience in the environmental field. Currently she specializes in program and project quality management, systematic planning, preparation, and review of QA program and/or project plans (QAPPs), QA management plans (QMPs), field sampling plans, data verification, data evaluation, data validation, QA audits including method/process audits, on-site laboratory audits and project on-site field audits, as well as Nuclear Quality Assurance (NQA-1) project and nuclear supplier audits.

Ms. Caprio leads an in-house data validation team, and her data validation experience includes chemical, radiological and geotechnical parameters for media including but not limited to sediment, soil, porewater, groundwater, surface water, biota, tissue, soil vapor and air monitoring. Ms. Caprio also provides QA training both internally through the various office locations within Geosyntec and externally for clients that teaches the importance of proper documentation practices for collecting, handling, and analyzing defensible, traceable, and transparent data of known quality.

Ms. Caprio has extensive technical experience, which includes natural attenuation of petroleum hydrocarbons and chlorinated solvents, bioventing, biosparging, land treatment, and treatability studies, bioremediation system design, technical support for project managers, and work plan development. She has more than 20 years of experience as an analytical chemist in environmental and biotechnology laboratories including laboratory management, data management, quality control/QA, and supervision of wet chemistry, gas chromatography, and high-performance liquid chromatography departments. Her experience also includes methods development, design and execution of treatability studies involving biological treatment of hazardous wastes and mixed wastes. Her data validation expertise includes all media types and chemical and radiological parameters.

## KEY PROJECT EXPERIENCE

*Unified Federal Policy (UFP)-QAPP, Former Plattsburgh Air Force Base, New York.* Technical Reviewer. Assisted with the development and final review of the UFP-QAPP for site inspection work which was conducted as part of a project titled Aqueous Film Forming Foam Supplemental Site Inspection at Former Plattsburgh Air Force Base, New York. Responsible for coordination and final review of Stage 4 validation of data analyzed for per- and polyfluoroalkyl substances (PFAS) by U.S. Environmental Protection Agency (EPA) Methods 3535/537 Modified.

*Aerojet Rocketdyne, Sacramento, California.* QA Manager for projects in support of Aerojet Rocketdyne. Responsible for overall data quality produced by analytical laboratories under the Aerojet Rocketdyne Environmental Compliance Program for groundwater, influent, and effluent samples. Responsible for annual on-site field audit by subcontracted sampling personnel, full on-site laboratory audits for all laboratories providing project analytical results, laboratory program oversight, trouble shooting, analytical forensics, and ongoing QAPP development as needed. Responsible for investigation of analytical exceedances and data anomalies. Responsible for completion of full validation of five percent of the data and oversight of 100% of the data being validated.

*Port Heiden/Fort Morrow Formerly Used Defense Site (FUDS), Port Heiden, Arkansas.* QA Manager. Coordinates and performs final review for Stage 2A review of analytical data associated with the Port Heiden/Fort Morrow FUDS. Review entails agreement with the applied validation qualifiers per guidance, the UFP-QAPP, and Alaska Department of Environmental Conservation (ADEC)-specified data quality. Validation requires assessment of analytical data for conformance to the project-specific Unified Federal Policy QAPP (UFP-QAPP) as well as the ADEC-required data quality checklists. The effort requires a detail-oriented skill set in order to manage input of data qualifiers into the project database by working closely with the database manager for the project.

*QA Manager, Confidential Client, America Samoa.* Responsible for reestablishing analytical protocols and quality control systems for the on-site laboratory for analyzing wastewater samples for National Pollutant Discharge Elimination System compliance purposes, ongoing method development and establishment for analytical wastewater support, quality training for client staff, revision and editing of standard operating procedures, and annual on-site audits.

*Gowanus Canal Superfund Site Remedial Design, Brooklyn, New York.* QA Manager. Responsible for the development and finalization of the UFP-QAPP and Field Sampling Plan pertinent to project tasks to date.

*Investigation and Characterization of Former Adak Naval Complex Project, Adak, Arkansas.* QA Manager. Developed the Sampling and Analysis Plan (SAP) for the U.S. Department of the Navy Naval Facilities Engineering Command Northwest under the Environmental Multiple Award Contracts and under the regulatory oversight of ADEC. The SAP was specific to the investigation and characterization of the East Canal/Building T-1341. Responsible for coordinating the data validation of the samples sent to the fixed base laboratory for analysis.

*Terry Creek Sediment Site, New Brunswick, Georgia.* QA Manager. Responsible for the development and application of the QAPP as well as the validation of the data. This site is impacted with toxaphene. Responsible for coordinating method development and comparison between Method 8276 (Parlar Method), Method 8081 (Technical Toxaphene), and Total Area Under the Curve with the involved analytical laboratories as well as interpretation of the data.

*Savannah River Site Project (NQA-1).* QA Manager responsible for the overall implementation of all QA practices for the project, including on-site activities: drilling practices, sample collection, on-site project documentation, and on-site geotechnical testing/measurements; off-site laboratory geotechnical testing; and engineering practices and procedures utilized for the project. Responsible for ongoing audits for sub-tier contractors throughout the project as well as audits of the project offices, both on-site and off-site.

*On-Site Waste Disposal Facility Project, Portsmouth Gaseous Diffusion Plant, Piketon, Ohio.* Corporate QA Manager for engineering design tasks. Responsible for the development of the in-house NQA-1 QA program implemented by the engineering design group to support the project data quality objectives. The quality system included development of the QA project plan and the relevant standard operating procedures necessary to successfully complete the project tasks. Responsible for meeting with client auditors, providing response to comments, and verifying the implementation of corrective actions as needed.

*Naval Auxiliary Landing Field Site SAP, San Clemente Island, California.* QA Manager responsible for preparation and implementation of the SAP (under Navy UFP-QAPP specifications) for the Naval Auxiliary Landing Field Site. Responsible for field and laboratory audits as well as coordination of laboratory analyses and data validation.

*Berry's Creek Study Area, New Jersey.* QA Manager for Berry's Creek Study Area, a mega-sediment site in EPA Region 2. Responsible for the preparation, final review and implementation of the UFP-QAPP. Conducted field and laboratory audits against project requirements. Coordinated analytical method development for tests specific to sediment and tissue samples with intricate matrices with the laboratories. Responsible for the Stage 4 and Stage 2B validation of 100% of project data.





#### Specialties

- ✓ Data Management Expert proficient in SQL Server and Geospatial Technologies
- ✓ Project Manager with a diverse set of projects in the fields of environmental remediation and construction support services
- ✓ More than 8-Years' experience managing the design and implementation of environmental databases
- ✓ Proficient developing automated workflows to receive, process and report on data in a variety of circumstances

#### Education

Graduate Certificate GIS Analyst: Applications Specialist, Sir Sandford Fleming College, 2012

B.Sc., Environmental Science, University of Western Ontario, London, Ontario, 2011

Advanced Diploma of Environmental Technology, Fanshawe College, 2009

## CAREER SUMMARY

Mr. Higgins is a Data Management Specialist with Geosyntec. Mr. Higgins supports various environmental remediation projects; and manages the development and implementation of information management systems for construction, infrastructure tracking and reporting projects throughout the United States and Canada. His work has focused on developing and implementing automated data workflows and visualization involving spatial and non-spatial data sets; presenting data in 2-, 3- and 4-Dimensions; and custom electronic reporting solutions. Mr. Higgins is a database and GIS expert, proficient in Microsoft SQL Server, ESRI ArcGIS/ArcGIS Server, Geocortex Essentials, and many other tools and software packages.

## KEY PROJECT EXPERIENCE

*Waterfront Toronto Information Management System, Michael Van Valkenburgh Associates, Inc., Toronto Ontario.* Mr. Higgins is managing the development and implementation of a comprehensive Information Management System for Waterfront Toronto since 2019. The system tracks the progress and analyses as-built details of a secant pile wall, slurry walls, and geomembrane installation while incorporating Construction Quality Assurance (CQA) data related to seepage rates, construction testing, and materials logging. A dashboard, updated in real time, provides interactive filtering, alerting, and visualization of environmental monitoring data collected as part of construction activities.

*Ogliuga Remedial Investigation, Ogliuga, Alaska.* Mr. Higgins is managing the Information Management System and is the GIS Manager of Record for the Ogliuga remedial investigation. Work included accessing data collected from a custom-built mobile field collection app; developing automated workflows for the collection, verification, storage, reporting and dissemination of all field-collected project data including analytical results, and reporting of those data in a fully interactive 2-dimensional webmap and custom tabular reports. Mr. Higgins used SQL Server, ESRI ArcGIS / ArcGIS Server, Geocortex Essentials, and custom scripts and code to oversee and implement day-to-day data management tasks and provide database and reporting support for the field team and project stakeholders.

*Portland Harbor Superfund Site, Portland, Oregon.* Mr. Higgins managed a spatial database and facilitated spatial and nonspatial data analysis for a client group of potentially responsible parties at the Portland Harbor Superfund Site. Work includes refreshing database as new field data are available, the automation and execution of spatial interpolation workflows and analysis, the building of digital tools to track field efforts, and the management of a complex database containing a vast

historical dataset and data from recent and ongoing investigations. He uses Microsoft SQL Server, ESRI ArcGIS/ArcGIS Server, Geocortex Essentials the support this project

*Atka Remedial Investigation, Atka, Alaska.* Mr. Higgins managed the Information Management System and is the GIS Manager of Record for the Atka remedial investigation. Work included accessing data collected from a custom-built mobile field collection app; developing automated workflows for the collection, verification, storage, reporting and dissemination of all field-collected project data including analytical results, and reporting of those data in a fully interactive 2-dimensional webmap and custom tabular reports. Mr. Higgins uses SQL Server, ESRI ArcGIS / ArcGIS Server, Geocortex Essentials, and custom scripts and code to oversee and implement day-to-day data management tasks and provide database and reporting support for the field team and project stakeholders.

*Boone Dam, Tennessee Valley Authority, Spurgeon, Tennessee.* Mr. Higgins is managing the development and implementation of a comprehensive Information Management System for Boone Dam since 2015. The system incorporates real-time compilation of data generated during on-site construction activities including the construction of a secant pile cutoff wall, drilling and grouting activities and real-time instrumentation data including the deployment of a web-based three-dimensional Geographical Information System (GIS) that allows TVA personnel and other stakeholders access to grouting, geotechnical, and on-site data in a variety of tools and reports. This project supported the Association of Environmental & Engineering Geologists Project of the Year.

*Berry's Creek Study Area Remedial Investigation/Feasibility Study, Bergen County, New Jersey.* Mr. Higgins serves as the database manager for a multi-year site investigation. Work includes the implementation and management of an internet-accessible database management system, organization of field data-collection activities. Mr. Higgins uses SQL Server, Microsoft Access, and visual basic to oversee and implement day-to-day data management tasks and provide database support for database users.

*Gowanus Canal Construction Information Management System, National Grid USA Service Company, Inc., New York.* Mr. Higgins is managing the development and implementation of a comprehensive Information Management System for the Gowanus Canal Superfund site cleanup since 2020. The system tracks the progress of dredging activities and calculates volumes of materials removed from daily surveys of the canal. A comprehensive daily field report is generated in PDF format using photos and digital data generated in the field by Construction Quality Assurance (CQA) personnel. The system also tracks bulkhead installation, environmental monitoring data, and automates numerous reports and public-facing data streams for multiple stakeholders on the project.

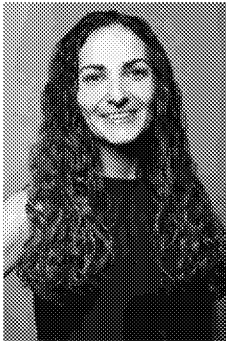
*C44 Reservoir, Indiantown, Florida.* Mr. Higgins was one of 2 primary developers for custom Information Management System for the construction of a 9.2 mile, 30-foot-high earthen embankment for C44 reservoir. GPS enabled field tablets are used on site for QC and construction personnel to track construction progress and QC samples. Data entry and sample tracking tools for the on-site laboratory were implemented replacing cumbersome paper-based workflows. A web-enabled construction and QC dashboard was developed with custom reports and interactive maps to facilitate the access, QC process, and reporting of data. The system is being used by the site contractor, subcontractors, and the United States Army Corps of Engineers (the site owner). The system was developed using SQL server, ArcGIS Collector, Survey123, ArcGIS Online, and Microsoft SharePoint.

*Southern Company (SC), Alabama Power Company (APC), Georgia Power Company (GPC), and Mississippi Power Company (MPC).* Mr. Higgins has been involved with the design, planning, and development of Construction Information Management Services to SC/APC/GPC/MPC. His specific project experience includes: (i) APC projects: Plant Barry Ash Pond; (ii) GPC projects: Plant Bowen Ash Pond, Plant Bowen General Service Water Pond, and Plant Wansley Ash Pond; and (iii) MPC project: Plant Daniel Ash Pond.

*Bolivar Dam Information Management System, Treviicos Corporation, Bolivar, Ohio.* Mr. Higgins assisted with the development of the Bolivar Dam Information Management System. Mr. Higgins developed database algorithms that: calculate and visualize barrier wall panels in three dimensions based on Koden data in near-real time; automatically imported and processed data from the contractor into a usable format; created templates to allow to allow vertically reports to be dynamically generated on demand.

## REPRESENTATIVE PUBLICATIONS

- 21-01 A. Higgins, M. Elgouhary, S. Lakes, B. Patel, M. Petersen, J. Rosen. Comparison of Multiple Verticality Survey Techniques, Applications on Boone Dam. In: Proceedings of the 2021 United States Society on Dams Annual Conference (April. 2021, Virtual)
- 19-01 Bolles, Nate, A. Higgins, R. Ameen. Improving Engineering Judgement Using 3D Geospatial Data Management Techniques. In: Proceedings of the 2019 United States Society on Dams Annual Conference (April. 2019, Chicago, IL)
- 17-01 Ameen, Rozh, R. Siebenmann, A. Higgins. Instrumentation and Information Management at Boone Dam. In: Proceedings of the 2017 United States Society on Dams Annual Conference (April. 2017, Anaheim, CA)



#### Specialties

- ✓ Environmental Statistics
- ✓ Multivariate Statistics
- ✓ Environmental Forensics
- ✓ Statistical Application Development
- ✓ Database Management
- ✓ Applied Research

#### Education

Ph.D., Mathematics and Statistics,  
University of Guelph, 2018

M.Sc., Mathematics and Statistics,  
University of Guelph, 2011

B.A., French Language and Literature  
and Statistics, University of Guelph,  
2004

## CAREER SUMMARY

Dr. Crea has more than 12 years of professional experience at Geosyntec where she is one of the lead statistical experts within the firm providing technical guidance on a variety of interdisciplinary projects. She specializes in applying multivariate statistical methods in support of risk and site assessments, evaluation of Monitored Natural Evaluation (MNA) as a component of a remedial action approach for contaminated sites, experimental design in support of applied research projects, development of statistical data analysis tools, and development/management of comprehensive environmental information management systems. Other focuses include the implementation of cutting-edge statistical methods for the handling and analysis of censored environmental data (adapted from survival analysis techniques) and the implementation of Monte Carlo methods for the estimation of the contaminant mass in groundwater and soil.

## KEY PROJECT EXPERIENCE

*Former Industrial Facility, Confidential Client, Australia.* Project statistician and database manager for a project involving the assessment of plume and source behavior for groundwater impacted by chlorinated solvents at a former chemical manufacturing facility. Project contributions include trend analysis, deriving first-order decay rate models to project potential lifespans for plumes and sources, dense non-aqueous phase liquids (DNAPL) dissolved phase mass calculations, database management, data visualization, and report writing.

*Former Industrial Facility, Confidential Client, United Kingdom.* Project statistician and database manager for a project involving the assessment of MNA for groundwater impacted by chlorinated solvents at a former chemical manufacturing facility. Project contributions include multivariate analysis, trend analysis, DNAPL mass calculations, database management, data visualization, and report writing.

*Various Landfills, Various Clients, USA.* Project statistician for projects involving the management of coal combustion residuals (CCR) as set forth in the USEPA CCR Rule. Project contributions include writing the statistical analysis plan that documents and provides details on the selected statistical methods, using the statistical methods to establish background conditions, and statistically evaluating groundwater monitoring data collected during detection and assessment monitoring to evaluate compliance.

*Former Industrial Facility, Confidential Client, United Kingdom.* Project statistician for a project involving the management of a large set of vapor, soil, and groundwater quality data collected at a former liquid waste disposal area located on fractured bedrock. Project contributions include multivariate analysis, trend analysis, risk calculations, data visualization, and report writing.

*Former Industrial Facility, Confidential Client, New Jersey.* Project statistician for the remediation of soil and groundwater at a contaminated coal tar site. Project contributions include the development of a statistical sampling design to determine whether compliance has been achieved through remedial activities, database management, and report writing.

*Former Industrial Facility, Confidential Client, Virginia.* Project statistician and database manager for a project involving the investigation and remediation of a large site contaminated with explosives, chlorinated solvents, and PCBs. Project contributions include database management, data visualization, trend analysis, background statistical analyses for site characterization and site risk assessment, and report writing.

*Berry's Creek Study Area Remedial Investigation/Feasibility Study, Bergen County, New Jersey.* Project statistician for a multi-year site investigation. Project contributions include various statistical analyses in support of site characterization and assessment, such as, classification and regression tree analysis (CART), calculations of upper tolerance limits, and statistical graphical visualizations.

*Background Data Analysis Tool, Various Projects.* Developer of a user interface tool that automatically generates the tables and figures required for background analyses conducted for risk and site assessments at USEPA CERCLA sites. The tool uses a combination of Microsoft® Access®, Microsoft Excel® and R statistical programming software for the automation of the workflow involved in a background data analysis as prescribed by USEPA guidance documents.

*Statistician and Database Manager, Various Projects.* Statistician and database manager for several different sites throughout Canada and the United States. Project contributions include automating and conducting routine statistical tests, managing relational databases designed to process data from various forms of electronic data deliverables (EDDs), performing complex data analysis, and automating generation of routine reports.

*Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Michigan.* Represented Defendant as an expert in matters that pertain to the historic polychlorinated biphenyl (PCB) contamination of the Kalamazoo River from paper mills and factories during 1929 to 1979. Project role included performing a statistical evaluation of and providing opinions about the methods used by opposing experts to estimate the relative contribution of PCB mass loads discharged from the paper mills to the river.

*Data Information Value to Evaluate Remediation, Department of Defense (DoD) Strategic Environmental Research and Development Program (SERDP).* Project statistician for a research project focused on developing technical guidance on the value of data in both the site characterization and remediation contexts based on detailed field data, empirical evidence gathered from some of the most respected and successful practitioners in the field, highly detailed virtual site investigations, and stochastic approaches to quantifying the value of additional information. Project contribution include analyzing large-scale virtual site datasets (VSD) using a two-step stochastic modeling approach: (i) calibrate uncertain site parameters (e.g., hydraulic conductivity, DNAPL source mass and mass discharge, biodegradation rates, etc.) modeled through probability distributions and; (ii) identify the best remediation strategy for minimal cost. Optimal remediation of the calibrated models was achieved by minimizing a cost function based on typical rates for enhanced in-situ bioremediation (EISB). The amount of site information used to estimate model parameters was increased stepwise to determine the effects on remediation success and costs.

*DNAPL Technology Evaluation Screening Tool Development, Department of Defense (DoD) Environmental Security Technology Certification Programs (ESTCP).* Project statistician involved with the development of a screening tool to aid users in the selection of a remedial technology for DNAPL sites. Project contributions include the review and analysis of DNAPL case study data via regression methods for developing metric-specific filtering criteria and for developing a User's Manual.

*Standardized Procedures for Use of Nucleic Acid-Based Tools, Department of Defense (DoD) Strategic Environmental Research and Development Program (SERDP).* Project statistician for a project focused on the fundamental research leading to the development of standardized protocols for molecular biological tests of environmental samples. Project contributions include the statistical design and analysis of controlled laboratory experiments involving five different labs and report writing.

## CAREER SUMMARY



### Specialties

- ✓ Soil and Sediment Sampling and Characterization
- ✓ Groundwater Bioremediation and Phytoremediation
- ✓ Field Assessment and System Implementation
- ✓ Environmental Permitting and Compliance

### Education

M.S., Soil Science, Louisiana State University, 2014

B.S., Environmental Management Systems, Louisiana State University, 2009

### Registrations and Certifications

Professional Geoscientist, Soil Science, Texas (12914)

Professional Geoscientist, Louisiana (1270)

Mr. Andries is a Senior Scientist with 13 years of experience in the environmental geoscience consulting field. He has been involved in soil and sediment sampling programs involving on aqueous phased liquids (NAPL) and subsurface groundwater discharge, site characterization using high resolution in-situ characterization technology [membrane interface probe (MIP) and electrical conductivity (EC) probing], sampling for sediment deposition rate using radionuclides, enhanced in-situ bioremediation projects, phytoremediation projects using the TreeWell® technology, geochemical groundwater and soil investigations, groundwater recovery system management, and Phase I and Phase II Environmental Site Assessments (ESAs); as well as the preparation of Federal Energy Regulatory Commission (FERC) environmental resource reports, environmental compliance plans, and providing general permitting support for municipal solid waste and industrial hazardous waste landfills.

Mr. Andries has also provided support for permit applications including the fulfillment of discharge monitoring requirements and National Pollutant Discharge Elimination System (NPDES) permitting support. His field experience includes groundwater sampling using bailers and low flow techniques, sediment sampling using vibracore and box-core samplers, emulsified vegetable oil and KB-1+ injections, TreeWell® installation oversight, soil boring programs, industrial process water sampling, industrial storm water sampling, soil gas delineation, and construction quality assurance.

## KEY PROJECT EXPERIENCE

*Phytoremediation utilizing TreeWell® systems, Multiple Sites, Louisiana and Texas.* Conducted the installation of over 100 TreeWell® groundwater remediation units to address groundwater contaminated with VOCs and NAPL at depths ranging from 12 to 115 ft below ground surface. The installation included feasibility studies to assess the nature and distribution of VOCs in the subsurface, soil sampling to assess the constructability of the units based on existing soil properties, installation of subsurface infrastructure, tree planting and tree management.

*Phytoremediation Project, Hackberry, Louisiana.* Designed and installed a phytoremediation system consisting of 30 augered plantings to address shallow groundwater contamination at a former hazardous waste disposal site.

*TRRP driven Soil and Groundwater Investigations, Multiple Sites, Texas.* Conducted soil and groundwater sampling and assisted with navigating the TRRP program to delineate impacts and multiple sites in Texas.

*Enhanced In-Situ Bioremediation (EISB), Republic Services International, Multiple Sites, Louisiana.* Oversaw the implementation of EISB at multiple locations throughout Louisiana. Work has included: Initial groundwater investigation using an electrical conductivity and hydraulic profiling tool as well as a cone penetrometer technology (CPT) to determine the lithology of the area and direct push technology groundwater sampling to characterize Volatile Organic Compound (VOC) concentrations; Injection of over 2 million gallons of NewmanZone Emulsified Vegetable Oil and bioaugmentation with KB-1+ bacterial culture to aid in the degradation of chemical constituents at depths ranging from 15 to 115 feet below ground surface; and performance monitoring groundwater sampling.

*mZVI-EISB Jet Injection, Republic Services, Texas.* Designed and installed a mZVI-EISB jet-injection pilot study to address VOCs in low permeability soil inaccessible to traditional injection techniques. The pilot study involved the

injection of over 18,000 pounds of microscale zero-valent iron (mZVI) and EISB microbial culture using high pressure (10,000 psi) injection equipment connected to traditional DPT tooling.

*Sediment and Surface Water Sampling, Multiple Sites, Louisiana, New Jersey, and Texas.* Conducted surface water sampling and oversaw sediment sampling using vibracore and modified box core samplers to provide a high-resolution characterization of the nature and distribution of VOCs and metals in waterbodies adjacent to hazardous waste and Superfund sites. Radioisotope samples of Beryllium and Lead were sampled to establish a sedimentation rate for the water body. Utilized an Acoustic Doppler Velocity Meter (ADVM) to gather surface water discharge velocity data.

*Geochemical Groundwater Investigations, Multiple Sites, Louisiana, New Jersey, and Texas.* Conducted groundwater sampling and data analysis to delineate arsenic and VOC concentrations in groundwater. Electrical conductivity (EC) and Membrane Interphase Probe (MIP) technologies were implemented to rapidly gather subsurface lithological and contaminant distribution data. Sampled drinking water wells to determine the source of dissolved methane by concentration and stable isotope ratios.

*Soil and Groundwater Investigations, Multiple Sites, Louisiana and Texas.* Oversaw the field activities of an oil and gas exploration and production legacy lawsuit involving soil and groundwater sampling for hydrocarbon and salt contamination at historical exploration and production sites throughout Louisiana. Analyses were performed in accordance with Louisiana Statewide Order 29-B.

*Groundwater Monitoring Well Network Installation, Pensacola, Florida.* Installed a groundwater monitoring well network surrounding a gypsum surface impoundment. The monitoring well installation included lithological characterization of the subsurface, gamma logging of the boreholes, filterpack design, and well installation.

*Groundwater Monitoring, Republic Services International, Multiple Sites, Louisiana and Texas.* Managed and implemented the sampling and reporting of routine groundwater sampling programs using passive diffusion bag (PDB) samplers at sites in Louisiana.

*Soil Vapor Intrusion Sampling, Cummins, Memphis, Tennessee.* Conducted soil vapor sampling to delineate offsite VOC migration from the Cummins Facility in Memphis, TN. Work included installation of gas probes and sample collection using a vacuum pump and Summa Canisters under purged headspace.

*Hydrocarbon NAPL recovery system monitoring and management, Multiple Sites, Louisiana.* Performed groundwater sampling and NAPL recovery monitoring and system management at a large railyard with a NAPL and contaminated groundwater plume related to a diesel spill in southeastern Louisiana. The remediation system included groundwater and NAPL recovery and treatment using an oil/water separator.

*Monitoring Frequency Reduction, MacAllen Chemical, Monroe, Louisiana.* Compiled surface water Discharge Monitoring Report data and prepared a Monitoring Frequency Reduction Request for MacAllen Chemical in Monroe, LA. The monitoring requirements for the site were reduced from weekly to once every two months.

*Landfill Gas Delineation, Browning-Ferris Services Group Inc. (BFI), Biloxi, Mississippi.* Conducted soil gas sampling at Gulf Pines Landfill in Biloxi, MS to determine the extent of migration of methane gas from the landfill.

*Phase I Environmental Site Assessments, Multiple Site, Louisiana.* Performed a Phase I Environmental Site Assessment supporting the purchase of property adjacent to a historical industrial disposal site. Performed site visits and report writing as a part of multiple Phase I ESA's at various types of sites including shipping/distribution facilities and proposed pipeline easements.

*LPDES Permitting Support, USPS, Multiple Sites, Louisiana.* Facilitated the onsite inspection and maintenance of sewage treatment systems, and sampling of sewage effluent at Post Offices located throughout southern Louisiana.

*LPDES Permitting Support, AutoZone Stores, Inc., Multiple Sites, Louisiana.* Managed the onsite inspection of sewage treatment systems and sampling of sewage effluent at AutoZone stores in Clinton, LaRose and Covington, LA. Facilitated DMR preparation and submittal as well as the implementation of corrective maintenance to bring the treatment systems back into compliance.



Specialties

- ✓ Field Oversight and Monitoring
- ✓ Groundwater investigation and remediation
- ✓ Soil vapour investigation and mitigation
- ✓ In-situ remediation

Education

B.Sc., Earth Science, Geology,  
University of Waterloo, Waterloo,  
2015.

## CAREER SUMMARY

Richard Steer is a Professional Scientist practicing in the vapour intrusion (VI) group of Geosyntec with over 7 years' experience in environmental site investigation and remediation. He has completed work at various industrial/commercial sites, active and historical, in support of site closure through remedial solutions, and has worked in multiple media, including soil, groundwater, and air. Mr. Steer is a project manager, dedicated to building a team of experts to develop site understanding, the conceptual site model, solutions for remedy development, and implementation, for efficient and effective communications within his team, his clients, and with other project stakeholders.

## KEY PROJECT EXPERIENCE

*Underground Storage Tank Removal, Confidential Client, Multiple Sites, Ontario.* Oversight conducted for the decommissioning and removal of USTs at previous truck and equipment yards. Excavations of impacted soils and confirmation sampling conducted prior to site restoration.

*Excavation of Petroleum Hydrocarbons, Confidential Clients, Northwestern Ontario.* Construction oversight of excavations of soils contaminated with petroleum hydrocarbons at historical spill locations and active diesel generating stations. Conducted confirmatory sampling and production of figures for reporting of extents of excavations. Oversaw the construction of remediation "biocells", where bioactivity was stimulated and monitored natural attenuation was conducted in liner-contained soil treatment trenches.

*Phase II Environmental Site Assessments, Confidential Clients, Ontario.* Conducted soil and groundwater investigations to produce site models for Phase II ESAs. Oversight of drilling activities, soil, groundwater, and soil vapour sampling, and plume delineation at former and active industrial facilities.

*In-situ Chemical Oxidation Design and Implementation, Confidential Clients, Northwestern Ontario.* Design of complex In-Situ Chemical Oxidation (ISCO) projects from analytical and spatial data. Coordination and mobilization of equipment to remote First Nation Communities in Northern Ontario. Implementation of direct push injection technologies.

*Construction Quality Assurance of Vapour Mitigation System Installation, Confidential Client, Developer, Toronto, Ontario.* VIMS Construction Quality Assurance (CQA) was completed by ensuring selected construction materials were installed in compliance with engineering drawings to meet design specifications. Work included measurement of thickness of spray-on barriers, smoke testing and oversight of site activities working with contractors.

*Construction Oversight of Vapour Mitigation System Installation, Confidential Client, Developer, Bolton, Ontario.* VIMS CQA was completed through oversight of construction of VIMS in compliance with engineering drawings, measurements of vapour barriers specifications, smoke testing and system performance testing in cooperation with installation contractor.

*Vapour Intrusion Investigations, Confidential Client, Due Diligence, Various Sites, Ontario and British Columbia.* Conducted multiple subslab soil vapour investigations in support of environmental due diligence practices for land purchasing or leasing throughout Ontario and British Columbia.

*Vapour Mitigation System Investigation, Design and Implementation, Confidential Client, Cornwall, Ontario.* High volume sampling and sub-slab sampling campaign was conducted to assess the need for a mitigation system. A subslab depressurization system was recommended and optimized system designed for client needs. Oversight of the

installation of the system was completed with confirmation testing of design parameters.

*Vapour Mitigation System Investigation and Design, Confidential Clients, Developer, Various Sites, Ontario and British Columbia.* High volume sampling and sub-slab sampling campaigns were conducted to assess the need for mitigation systems. The extent of the soil vapour plumes were evaluated, and soil vapour extraction wells combined with a subslab depressurization and venting systems was designed for client needs.

*Former Outboard Marine Corporation Canada Facility, Ontario Ministry of the Environment, Conservation and Parks, Peterborough, Ontario.* Took quarterly soil vapour samples from probes as part of an ongoing study. Three of the four quarters limited probes were sampled, and annually a comprehensive sampling event of the probes was completed.

*Residential Sub-slab Investigation, Confidential Client, Oakville, Ontario.* Installed and sampled sub-slab probes paired with indoor air samples in residential areas to assess possibility of vapour intrusion from a groundwater plume in an adjacent property.

*Vapour Mitigation System Investigation, Confidential Client, Developer, Oakville, Ontario.* High volume sampling and sub-slab sampling campaign was conducted to assess the need for a mitigation system. The extent of the soil vapour plume was determined, and small, optimized system installed.

*Potential Vapour Intrusion Identification, Confidential Client, Cheboygan, Michigan.* Conducted a high volume sampling event and indoor air sampling campaign to determine the potential for vapour intrusion and source identification. Cross-slab differential pressure monitoring was also examined while indoor air sampling to incorporate building pressure into the vapour intrusion assessment.

*Groundwater Plume Vapour Source Identification, Confidential Client, Bethpage New York.* Conducted a high volume sampling event which used near building groundwater wells screened across the water table to determine if a source from ground water was present and if the building was impacted. Public relations were at the forefront due to the buildings being located within an elderly community.

*Hydrogeological Investigation to Support De-watering and River Diversion, Waterfront Toronto, Toronto, Ontario.* Field Scientist providing technical oversight and data evaluation of bedrock core logging, geophysical surveys and packer testing to inform hydrological models and design of a cut-off wall and de-watering volumes for a water-way diversion.

*Groundwater Monitoring Programs, Confidential Clients, Ontario.* Environmental Scientist for groundwater monitoring programs at active and former industrial facilities in Ontario. Tasks include scheduling of field activities, monitoring well installation and development, low-flow groundwater sampling, tracking of field operations and routine report preparation.

*In-situ Smoldering Remediation at a former MGP Site, Confidential Client, New Jersey.* Field Scientist responsible for direct push drilling investigations as well as operation of STAR remediation systems at a 40-acre industrial site with coal tar contamination. Tasks included set-up, operation and troubleshooting of the STAR systems and planning/design of the operation sequence.

*EISB Injections, Confidential Clients, Kansas, Louisiana.* Staff Scientist for the implementation, performance monitoring and reporting of EISB systems. Tasks included culture and substrate injections, performance monitoring, data management and analysis, and report preparation.

*EISB Injections, Confidential Clients, Multiple Sites, Ontario.* Senior field staff for the implementation, performance monitoring and reporting of EISB systems. Tasks included culture and substrate injections, performance monitoring, data management and analysis, and report preparation.





Geosyntec<sup>®</sup>  
consultants


We make the path  
clearer

Vapor Intrusion Services



# Our Experts

Our world-renowned vapor intrusion experts are your best asset

A black and white photograph showing two people climbing a steep, craggy rock face. One person is higher up, reaching down towards the other. The background shows a vast, mountainous landscape under a cloudy sky.

Our experts continually sharpen their craft through research, teaching, authoring peer-reviewed journal articles, and shaping regulatory guidance. In the last 5 years alone they have taught thousands of people through courses given in the public and private sector.

## ■ Litigation support

Our experts have provided testimony and support on dozens of vapor intrusion cases, including major class actions, multi-party suits, cost allocation and recovery, and other matters.

- ◆ History and state of VI practice
- ◆ Clear explanations of the VI pathway
- ◆ Lateral extent of VI beyond sources
- ◆ Discerning background sources from VI
- ◆ Standard of care during VI investigations
- ◆ Standard of care during VI mitigation
- ◆ Reasonable costs of investigation and mitigation

## ■ We lead the field in applied research

With our academic and government partners in the U.S. and Canada, Geosyntec expanded the VI toolbox with peer-reviewed breakthroughs in the laboratory and field:

- Passive quantitative samplers
- Mass flux evaluation
- Advanced mitigation techniques
- High volume soil gas sampling
- Influence of seasonal variability
- Background forensic techniques
- Influence of preferential pathways
- Passive mitigation systems

## Credibility

When it comes to vapor intrusion, our experts wrote the book – from the Johnson & Ettinger model to lead authors of EPA and ITRC guidance, OSWER technical guidance, ASTM standards, and hundreds of groundbreaking papers and presentations.

Our experts helped develop, and were also invited reviewers of, many state and industry guidance documents, including New Jersey DEP, California DTSC, EPRI, DoD, and many others.

With this knowledge and insight, we provide clients with:

- Rapid and clear understanding of site conditions
- Credibility with regulators and stakeholders
- Creative, cost-effective solutions
- Finding solutions outside the box
- Strong expert testimony

### Ravi Arulanantham, Ph.D.

A toxicologist with more than 25 years of experience, he is one of the primary authors of California's Low-Threat Petroleum Case Closure Policy, which provides a process for evaluating vapor intrusion assessments of petroleum release sites.

### Helen Dawson, Ph.D.

A recognized leader in vapor intrusion, she was the primary author of the U.S. EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils in 2002 and architect of the EPA's VI database and other guidance for the Superfund program.

### Robert Ettinger

With more than 25 years of professional experience focused on the fate and transport of contaminants in the unsaturated zone and human health risk assessments, he is co-author of the Johnson and Ettinger (1991) algorithm for evaluating subsurface

contaminant vapor intrusion to indoor air, which is widely cited by many environmental regulatory programs and industry practitioners.

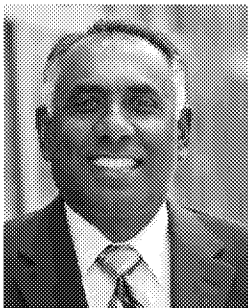
### David Folkes, P.E.

The nation's preeminent expert in VI mitigation; the architect of groundbreaking investigations at one of the first and largest VI sites in the US; contributor to EPA, state, and industry VI guidance; expert witness on over a dozen VI cases; and experience at more than 150 VI sites in North America, Europe, South America, and Australasia.

### Todd McAlary, Ph.D., P.Eng., P.G.

Co-author of the first USEPA guidance on vapor intrusion in 2001, he has been a member of the USEPA Expert Panel since 2000, a primary researcher for U.S. Federal research projects on passive sampling, high volume sampling, and building mitigation system optimization, and a principal investigator for hundreds of site assessments since 1992.

ravi arulanantham



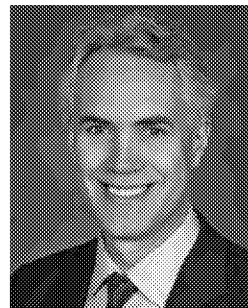
helen dawson



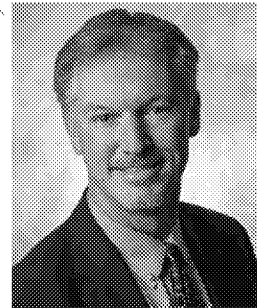
robert ettinger



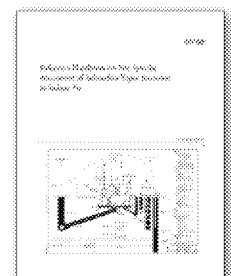
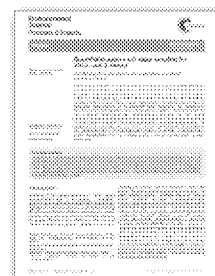
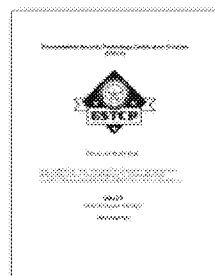
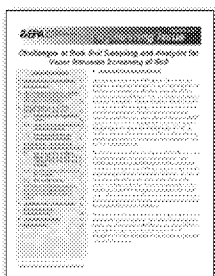
david folkes



todd mcalary



Our practitioners have authored more than 100 scientific, regulatory, and guidance documents related to VI.



## The widest range of capabilities

### ■ VI Risk Management

- Portfolio Audits for Vapor Intrusion
- Due Diligence for Property Transactions
- Risk Assessment
- Screening Level Development
- Stakeholder Communications
- Regulatory Negotiations

### ■ Focused Groundwater and Soil Vapor Investigations

- Define and Limit VI Investigation Areas
- Screen Out Buildings
- Address Preferential Pathway Concerns

### ■ Indoor Air and Sub-Slab Vapor Testing

- Accurate and Defensible Testing
- Passive Sampling and Building Pressure Cycling to Manage Temporal Variability
- High Volume Sampling to Manage Spatial Variability

### ■ Identification of Background Sources

- Building Surveys
- Comparisons to Typical Background Levels
- On-Site GCMS Analysis of Indoor Sources
- Fingerprint Analyses Using Compound Ratios and Isotopes

### ■ VI Management Strategies

- Site Development to Minimize VI Potential
- Institutional Controls
- Optimized Active Mitigation Systems
- Combining Site Remediation and VI Mitigation
- Passive & Sustainable Mitigation Systems
- O&M and Exit Strategies

### ■ Litigation Support

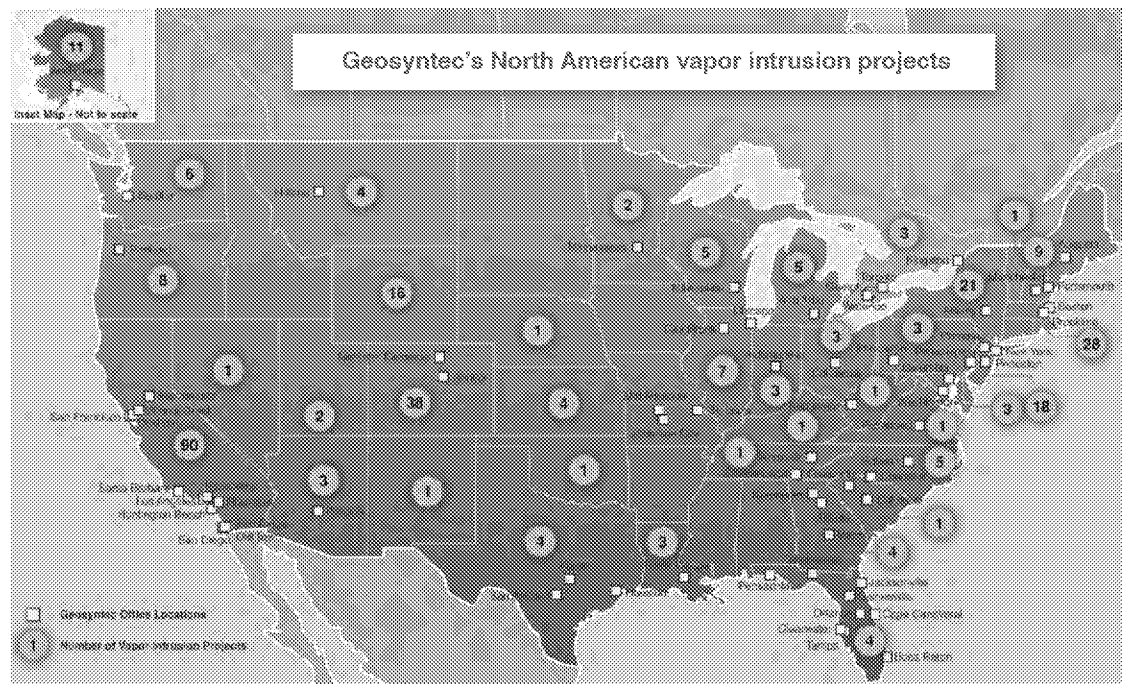
- Expert Witness Testimony
- Consulting Expert Support

## Unparalleled experience

Our international VI projects include sites in Australia, Belgium, Brazil, Canada, France, Italy, Malaysia, Mexico, Sweden, and the United Kingdom.

Geosyntec has worked on several hundred VI projects around the world, including evaluation and mitigation of VI impacts from VOCs, methane, and radon at:

- Industrial business parks
- Former oil refinery sites
- Residential neighborhoods
- Commercial buildings
- Dry cleaner sites
- Military facilities
- Schools and public buildings





## Vapor intrusion or background?

With the potential for human health concerns, answers cannot wait. Our techniques and forensic tools provide you with rigorous, defensible data as quickly as possible:

- High volume soil gas sampling
- Building pressurization cycling
- Real-time field tests (e.g., HAPSITE, mobile labs)
- Compound-specific isotope and molecular analysis to help distinguish the source
- Sub-slab sampling
- Passive indoor air and soil vapor tests, with tools like the Waterloo Membrane Sampler™

## Public relations and stakeholder confidence

Investors and occupants have reason to worry when a building is shut down for an investigation – they want to know your plan. When your plan involves Geosyntec, you have a world-class expert with an unparalleled track record for credibility, site closure, community outreach, and regulatory advocacy.

## We invent tools for faster, cost-effective assessment

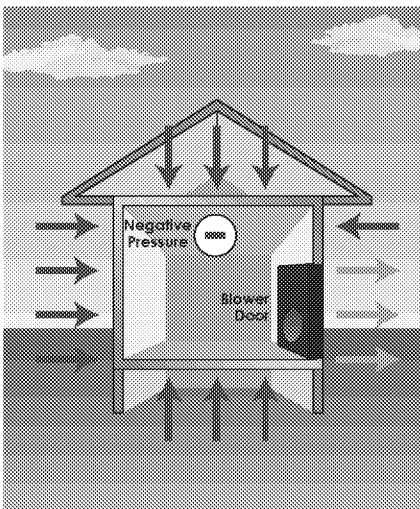
Our practitioners are at the forefront of applied research and development of 3-D model capabilities to simulate the VI pathway with mitigation features added using Computational Fluid Dynamics (CFD). This kind of sophisticated modeling has never been done for mitigation before.



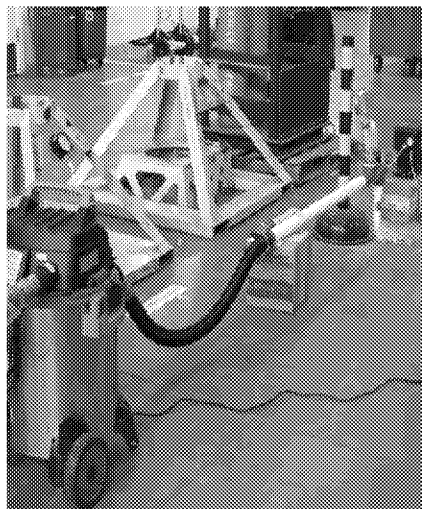
Background sources vs. vapor intrusion: isotope and forensic analysis can give clear answers

## We can help you investigate VI threats for any scenario:

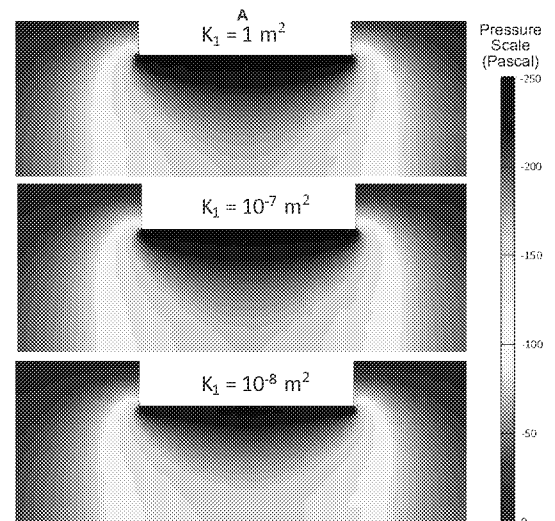
- Phase II ESAs for real estate transactions
- Voluntary cleanup site investigations at Brownfield sites
- Superfund and RCRA facility investigations
- Response to five-year remedy reviews
- Third-party claims
- Spill responses



Building pressure cycling



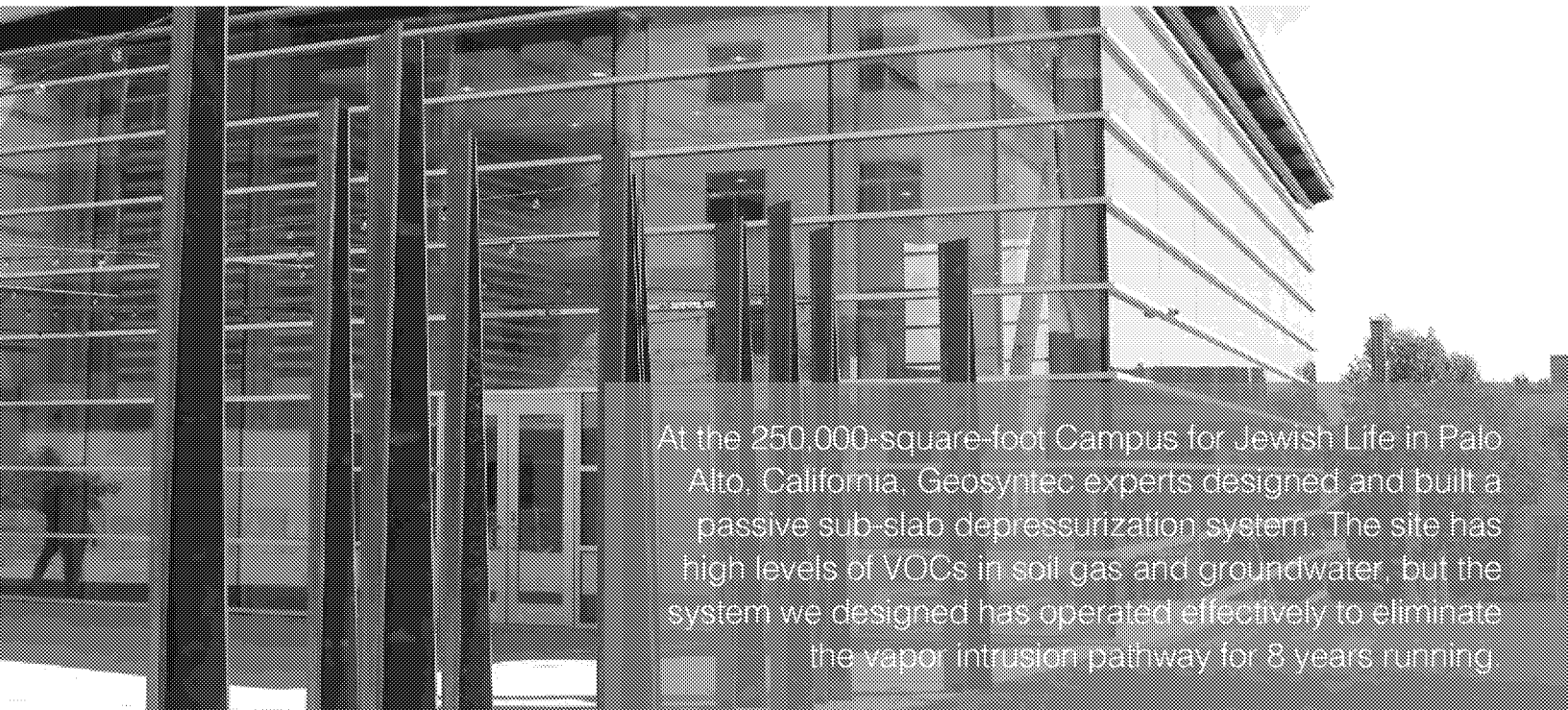
High volume sampling



3-D Modeling capability

# Vapor Intrusion Management Mitigation Design and Installation

Mitigation, site remediation, institutional controls



At the 250,000-square-foot Campus for Jewish Life in Palo Alto, California, Geosyntec experts designed and built a passive sub-slab depressurization system. The site has high levels of VOCs in soil gas and groundwater, but the system we designed has operated effectively to eliminate the vapor intrusion pathway for 8 years running.

Lower cost solution, higher returns –  
we clear the way

## Thinking beyond standard mitigation systems

With thousands of commercial, industrial, and residential buildings mitigated by our experts within the last 20 years, we know where to find cost saving opportunities while maintaining or improving system effectiveness.

- We use new technologies and passive systems to reduce operating costs, and we offer real time system monitoring
- When mitigation is necessary, we use focused designs to minimize the system footprint and energy use, reduce iterative system testing, and lower overall life cycle costs
- There are creative ways to redevelop sites, including administrative controls that reduce or eliminate the need for mitigation, and advanced technologies like aerated flooring

Self-contained sub-slab blower and treatment equipment





# Protect human health

## The most efficient, innovative, green technologies on the market

The makers of Cupolex® asked us to help them develop design procedures and pioneer the use of passive and active VI mitigation systems using their 100% recycled plastic forms. This passive mitigation solution creates a continuous void space below concrete floor slabs — an aerated floor that provides better venting at lower cost than traditional systems.

From coast to coast, we lead the industry with the most Cupolex® aerated floor systems designed, installed, and operating efficiently.

## Reduce disruption to facility operations

Using our advanced building characterization techniques, Geosyntec can collect mitigation system design criteria while minimizing interruptions to facility operations. We can assess areas under the slab where access is restricted by machinery or current use. Our designs result in fewer site visits, less construction material, and less effort for operation and maintenance.

## Include world class experts on your team

Our internationally recognized experts lead the field in mitigation design, including:

- Mitigation projects on five continents
- Instructors for ITRC VI training programs, including the mitigation section
- Co-authors of ITRC VI and petroleum VI guidance documents
- Leaders in sustainable mitigation system R&D, including multiple ESTCP awards to create guidance



We have more experience than any other firm designing and installing green, highly effective, and low cost Cupolex® aerated floors across the U.S.

## Services

- One stop for evaluation of vapor control options, including remediation, mitigation, and institutional controls
- Diagnostic testing to improve design efficiency and effectiveness
- Expert design and installation of sub-slab depressurization, sub-slab venting, and other systems
- Ongoing system operation, maintenance, and monitoring

## There is no “one size fits all” for large-scale, time critical transactions

Our vapor intrusion practitioners can help you design customized and comprehensive due diligence programs for large- and multi-location mergers, acquisitions, and divestitures; develop “cost to cure” assessments for environmentally impaired properties; and provide expert witness and litigation support for cost recovery actions associated with mergers, divestitures, and acquisitions.

Our clients include developers, owners, investors, and insurance companies who rely on our combined understanding of complex vapor intrusion mitigation and risk management.

**VI issues can impact sales prices, insurability, and the ability to obtain loans. Geosyntec can guide you through:**

- ASTM 2600 vapor encroachment assessments
- ASTM E1527 Phase I Environmental Site Assessments, including the potential for VI to be a recognized environmental condition
- Multiple site assessments during the merger/acquisition due diligence process

## Clear strategies, clear solutions

- ◆ Specialized testing to confirm or rule out VI potential
- ◆ Realistic testing and mitigation cost estimates for escrow accounts
- ◆ Rapid preemptive mitigation







Geosyntec is a specialized consulting and engineering firm helping private and public sector clients address their new ventures, complex problems, and vital studies involving our environment, natural resources, and civil and industrial infrastructure.

[geosyntec.com](http://geosyntec.com)



## **Project Management for Environmental Concerns**

**RSJ Consulting, LLC is an environmental project management and consulting firm that provides strategic direction, project planning and execution support, and technical expertise to help our clients meet complex environmental challenges. We specialize in managing new development projects and major expansions of existing facilities, regulatory negotiations, and litigation support including expert witness testimony.**

**RSJ Consulting can manage your environmental concerns so that you can focus on what makes your business viable.**

- We have proven relationships and successful compliance history with regulatory agencies.
- We can reduce the frustration of navigating complex regulatory programs.
- We can ensure your environmental permits are suitable for efficient and realistic operating conditions.
- We assemble the strongest possible team for successful delivery of your project. We custom-build our teams with internal and external subject matter experts for your specific scope of work for tasks such as permitting, investigation, wetlands delineation, modeling, testing, remediation, closure, etc.
- We will coordinate the tasks needed to execute your project through to completion including managing the team players, schedule, budget and development of technical reports and deliverables.
- We will routinely communicate the status of the project with all stakeholders.
- We will save you money through our efficiency and oversight of your environmental projects.

**See also [Attachment A – RESUMES](#)**

**For additional information contact:**

**Bob Jones, P.E.**

(512) 422-9796  
Bob@RSJConsult.com  
8210 Espanola Trail  
Austin TX 78737



**Robert S. Jones, PE**

8210 Espanola Trl., Austin, Texas 78737

512.422.9796

Bob@RSJConsult.com

**Robert Jones has more than 40 years of engineering, consulting, project management and governmental regulatory experience in the environmental arena. His areas of expertise include strategic planning, regulatory compliance, engineering design, water quality evaluations, senior level program and project management, regulatory permitting, and multimedia remediation. Robert is experienced in all aspects of managing the business of environmental consulting.**

#### **Education and Licensing**

M.S. Environment Health Engineering, University of Texas at Austin, 1982

B.S. Civil Engineering, Lamar University 1973

Registered Professional Engineer, State of Texas, 1978

#### **Completions**

Owner President Management Program, Harvard University, 1993

Numerous Continuing Education Activities in the area of Environmental Engineering

#### **Sample Projects**

##### **Oil Refinery Expansion**

Oversaw the environmental permitting activities for the largest refinery expansion in the U.S. in more than a generation. Multimedia activities included air quality, hazardous and solid waste, water quality and U.S. Army Corps of Engineers.

Served on a task force which successfully negotiated with representatives of local neighborhoods. Negotiations involved permit terms and conditions, as well as commitments to certain community improvement activities. This negotiation became a model for future Environmental Justice activities in Texas.

##### **Crude Oil Export Facility**

Evaluated the safety and performance of Single Point Moorings for a confidential client. The resulting information report included: a worldwide inventory list, depths, locations, and a detailed evaluation of each United States SPM for performance, tanker traffic volume, and safety/spill events.

##### **Barge Transport Feasibility Study**

Prepared a barge transportation study to evaluate the feasibility of waterborne transportation of coal from the Illinois Basin to a proposed power generating station on the Texas Gulf Coast. Water transportation routes were evaluated in segments to better understand the options and limitations along the route ( Ohio River to Mississippi River, East St. Louis and Ohio River interconnection, GIWW and ICWW). Items assessed included travel time, barge sizes, fleet assembly, types and number of tug boats, route closure estimates and delivery cost.

## **Robert S. Jones, PE**

### **Sims Bayou Petroleum Coke Handling Facility**

Supervised the permitting, design and construction of a solid bulk handling terminal on the Houston Ship Channel. The facility was designed to transport by rail, store and reload to barge more than 500,000 tons per year of petroleum coke produced by the then Atlantic Richfield Refinery. Permitting activities included air quality, water quality and US Army Corps of Engineers. Construction activities were complicated by the arrival of Hurricane Alicia midway through the project (tidal surge and 25 inch rain). Construction was restarted and project successfully completed.

### **1200 Megawatt Solid Fuel Power Plant in Matagorda County, Texas**

Provided project management and engineering services for a proposed solid fuel power plant in Matagorda County, Texas. Environmental permitting was performed by Robert's staff in the areas of air quality, water quality, solid waste, U.S. Army Corps of Engineers and Matagorda County Flood Control Office. Extensive interaction was required with regulatory agencies including Texas Commission on Environmental Quality, Matagorda County Navigation District, Texas Department of Transportation, Lower Colorado River Authority and the U.S. Coast Guard. Numerous public meetings and conferences were held with various stakeholders.

### **Power Plant Construction in Texas**

Oversaw the environmental permitting, water supply and wastewater treatment for a 600 MW Greenfield, natural gas power plant in central Texas. Responsibilities included managing a team of engineering, scientific and construction management professionals who prepared complex permit applications, designed water supply and wastewater treatment facilities and oversaw construction.

### **Battery Recycling Facility Closure**

Oversees, at the program management level, the environmental aspects of the closure of a battery recycling facility in north Texas. Numerous fence line issues exist. Public input and communication is a significant part of the project. Substantial interface with the Texas Commission on Environmental Quality and U.S. Environmental Protection Agency is required.

### **Government/Industry Environmental Improvement Initiative**

As a member of Governor Ann Richard's Task Force 21, lead a collaborative effort between Texas oil refineries and Texas regulators to develop streamlined, environmentally responsible policies for refinery remediation, permitting and compliance.

### **Oversight of the Construction of Wastewater Treatment Plants in Texas**

As a project engineer, and eventually as Chief Engineer at the Texas Water Quality Board, was responsible for review of preliminary engineering, design and construction of numerous publicly owned wastewater treatment plants around Texas. These facilities were funded with 75% federal grants. TWQB was charged under a delegation agreement with the U.S. Environmental Protection Agency to protect public interest.

While with the Texas Water Quality Board, managed the State and Federal responsibilities for the construction of a 200 million gallon per day, pure oxygen wastewater treatment plant in Houston, Texas. The plant is owned by the City of Houston and was funded in part with a federal grant administered by the TWQB. Robert's responsibilities included overseeing planning, preliminary engineering, design and start of construction.

## Robert S. Jones, PE

### Employment

*April 2012 – Present*

Owner, RSJ Consulting, LLC, Environmental and Project Management Services

*December 2007 – February 2012*

Executive V.P., RPS Group, Management and Consultancy Services Worldwide  
(RPS Group purchased JDC, LLC)

*October 1997 – December 2007*

Cofounder and President, JD Consulting (JDC, LLC), Environmental and Project Management Consultants

*September 1995 – September 1997*

Sole Proprietor, Environmental Project Management, Industry and Government

*September 1993 – September 1995*

Senior V.P., RMT, Inc., Environmental Engineers and Consultants  
(RMT purchased Jones and Neuse, Inc.)

*February 1982 – September 1993*

Cofounder and President, Jones and Neuse, Inc., Civil and Environmental Consultants

*July 1973 – February 1982*

Texas Water Quality Board (Now Texas Commission on Environmental Quality)  
Project Engineer to Chief Engineer, Construction Grants and Water Quality Planning

### Organizations and Recognitions

Distinguished Alumnus, Lamar University, 2013

Member, Lamar University Foundation Board, Present

Member, College of Engineering Advisory Council, Lamar University, Present

Board of Regents, Lamar University, 1992 – 1995

Finalist, Entrepreneur of the Year in Austin, Texas, 1991

Member, Board of the Consulting Engineers Council of Texas

Member, Advisory Board, Clean Energy Incubator (part of Austin Technology Incubator)

Member, Child Development Board, Austin Area YMCA

Member, Texas Water Conservation Association

Member, National Society of Professional Engineers

### Partial List of Clients

ExxonMobil

Valero

Motiva Enterprises (Shell and Aramco)

Royal Dutch Shell

British Petroleum

Citgo

Alcoa

Kinder Morgan

Exide Technologies

TGS Group

Mesa Energy

City of Austin

City of Houston

Texas Department of Transportation

U.S. Department of the Navy

**Robert S. Jones, PE**

Kathleen has work experience in the environmental services area since 1979 mostly as a consultant but has also worked in environmental laboratories and industry. Her broad range of experience makes her an effective project manager, especially for new construction/development projects. Kathleen has multimedia and regulatory compliance experience related to the rules promulgated by federal environmental regulatory acts including RCRA, CERCLA, CWA, CAA, PHMSA, OPA, NEPA, TSCA, OSHA and several others. Kathleen's work primarily focusses on work in Texas. Specific examples of work performance are: permitting strategy and application preparation for all environmental media; compliance audits, real estate environmental site assessments; NEPA environmental documents; pollution prevention plans, spill plans (SPCC, SWPPP, ICP, emergency response...); environmental management systems; pipeline integrity management reporting and planning; and remediation studies including investigations, risk assessments, and corrective measures. Kathleen has worked with a variety of client types including business developers for industrial parks and specific projects both large and small; electric generation; petroleum/petrochemical plants, oil/gas industry; aggregate (concrete and asphalt); paper products; recyclers and waste management; transportation industries (pipeline, marine, railroad, trucking, repair, and cleaning); food processors/distributors and U.S. Department of Defense (Air Force, Navy and Army).

#### Education

B.S. Environmental Science, Lamar University 1980

#### Recent Sample Projects

**TGS Cedar Port, LLC (Baytown, Texas):** Serve as Environmental Advisor to owners for development of a 14,000+ acre industrial park complex. In this role Kathleen works side-by-side with owners, improvement district managers, design engineers and construction managers to ensure proper permits are obtained and on-site work is in compliance with the permits. Provide strategic recommendations for environmental development concerns and/or issues such as: permitting requirements for prospective tenants, emission credits in a non-attainment area, wastewater treatment opportunities, storm water management and wetland mitigation/permitting. In addition, assist owners in planning for future infrastructure and development such as regional industrial wastewater treatment and marine dock services.

**South Hampton Resources (Silsbee, TX):** Work with environmental staff to provide regulatory assistance as needed. Prepare annual waste summary reports, assign waste codes, and prepare written waste classification documentation as required by TCEQ for plant records. Updated the five-year Pollution Prevention Plan and prepare the annual P2 reports online to TCEQ. Prepared the SPCCs and Facility Response Plans and aided maintenance on requirements to comply with spill containment. Assisted with compliance requirements for an oil spill from a tank due to an unusual storm event and prepared the written closure documentation for TCEQ submittal.

## **Kathleen B. Alsup**

**Gulf States Pipeline Company (Silsbee, Texas):** Assist the facility's pipeline manager with PHMSA, NPMS and RRC requirements. Attend and participate in Railroad Commission inspections of pipeline and provide follow-up as needed. Assist with application preparation and approvals for pipeline replacements from agencies (TXDOT, County, City, Railroad crossings and RRC). Prepare various RRC and PHMSA annual and/or construction and mapping reports. As part of the Pipeline Integrity Management program required by both DOT and RRC, prepare and maintain documentation including the Integrity Management Plan, Public Awareness Program, Operator Qualification/Training Program, Facility Response Plan and the Inspection, Maintenance and Operations Manual. Worked with the Railroad Commission on a pipeline spill site that resulted in groundwater contamination to demonstrate the pollutants were not migrating and delineated the contamination to a localized area surrounding the pipeline spill incident. Assisted the client in finding the property owner to allow the client to purchase the parcel so that an environmental covenant could be placed at the spill site and the incident could be closed with the Railroad Commission.

**Dover Industries (Boulder, Colorado):** Currently serve as the Environmental Remediation Manager representing the client for interaction with contractors, current property owner and state agency on the clean-up of groundwater contaminated by historical use of a chlorinated degreaser at a manufacturing facility. Primary constituents requiring treatment include trichloroethane, dichloroethene and 1,4-dioxane. The pollutants migrated off-site prior to discovery of the release. Project responsibilities include overseeing and managing the remediation contractors, reporting progress to Dover, reviewing, and approving scopes of work, cost proposals, reviewing work plans and reports prepared by contractors and interacting with state agency and interested parties on behalf of the client. Remediation efforts have significantly reduced the concentrations of pollutants as the site approaches closure. Efforts have included an extensive excavation of the primary source area, pump and treat and both biological and chemical injection treatments.

**Various Industries (Texas):** Provide assistance to environmental managers as requested. Includes attending agency inspections, addressing enforcement order requirements, environmental audits, preparing/updating environmental plans and records such as SPCCs, SWPPPs, pollution prevention, permit renewal applications, solid waste registrations, update Notice of Registrations, annual waste summary reports, transfer of permits for real estate transactions and other miscellaneous requests.

**Confidential Greenfield Chemical Plant (Texas Gulf Coast):** Built a team of environmental experts to provide strategic assistance during the due diligence, site selection and preliminary design phases for a proposed large greenfield Ethane Cracker and Polyethylene/Polypropylene manufacturing facility. Worked with various project team members including client's environmental, engineering and business development staff and attended working meetings as needed to provide support as decisions were being made about the project. Environmental assessments and reviews were performed for air, wastewater, waste and wetlands as components of the project site and design became available. Focus in the early stages was primarily air (pollution controls and operation requirements) and wetlands (construction impacts and mitigation options). Project was postponed at Phase IV before permit applications were submitted to TCEQ and USACE.

**Jefferson Energy Companies (Beaumont, Texas):** Served as Environmental Project Manager during development and construction phases for a crude rail to barge terminal and a gas processing plant. Provided strategic environmental support to design engineers, construction managers, operation managers, corporate officers, and investors. Assembled a team of environmental permitting staff and



## Kathleen B. Alsup

oversaw the preparation of air permits (PBRs, NSR, PSD, GHG and Title V), air dispersion modeling, water right permits, hydrostatic testing permits, Multi-Sector Storm Water Permits, Construction Storm Water Permits, Integrated Contingency Plan for terminal, SPCC Plan for Gas Processing Plant and Solid Waste Notice of Registrations. Provided environmental training and support to understand the environmental operations requirements including best management practices, inspections, and record-keeping. Assisted with initial TCEQ and USCG inspections of sites. As the projects developed and customer needs were being established for Jefferson Energy Companies, modifications to existing permits and plans were provided to accommodate future needs. Recommended long-term environmental staff to hire for operations.

**White Stallion Energy Center (Near Bay City, Texas):** Served as Environmental Project Manager during development phase of a \$3 billion 1320 MW solids fuel electric steam generating unit using CFB technology. Kathleen provided project coordination with design engineers as various options were considered to determine the associated environmental impacts. Kathleen worked directly with the officers of the company on tasks such as public/government relations, oversight of multiple contractors (surveyors, geotechnical), fuel transportation studies (barge and rail), bid solicitations, water supply availability (surface and groundwater) studies and local drainage and floodplain evaluations. Kathleen worked with a team assembled to prepare the permit applications for air (PSD, NSR, HAPs), wastewater discharge, USACE (Section 404 and 10) and FAA. The air permitting process included a public hearing that ended in the issuance of one of the last solid fuel power plant air permits. Kathleen also assisted the team with the cost and quality evaluation of various water supply options including surface, groundwater, treated wastewater and sea water. This included working with attorneys to develop contracts for water supply. Kathleen participated in the multiple public meetings that occurred for this project. Other management services included maintaining a project schedule, facilitating team meetings, and soliciting and engaging other contractors for development activities as needed.

### Employment

*July 2015 – Present*

RSJ Consulting, LLC

*April 2003 – July 2015*

JD Consulting and RPS Group (purchased JD Consulting)

*July 1985 – March 2003*

Radian Corporation and URS (purchased Radian Corporation)

*July 1980 – June 1985*

Texaco, Inc. (currently Motiva)

*January 1979 – June 1980*

Sabine River Authority and Kemron Laboratories

### Organizations and Recognitions

Rotary Club of Beaumont - Board Member, Paul Harris Fellow+2, Spirit of Rotary Award, WDWR Committee Chairman

Jason Alliance of Southeast Texas (STEM Program for Grades 3-8) - Board Member, Volunteer Coordinator

## Kathleen B. Alsup

### Partial List of Clients

TGS Group  
Dover Corporation  
South Hampton Resources, Inc.  
Sprint  
BASF  
Celanese  
INEOS  
New Wave Energy  
LNVA  
Mauser  
Jefferson Energy Companies  
Gulf States Pipeline Company  
Gulf Copper & Manufacturing Corp.  
Vessel Repair  
Motiva  
ExxonMobil  
Valero  
OCI  
Port of Beaumont  
Union Pacific Railroad  
LaPoint Railcar Cleaning & Storage – Texas, LLC  
Intercontinental Terminals Co., LLC  
Department of Defense  
Texas Wine Industry

**Kyle has over 25 years of diverse project management experience gained from service in the U.S. Army (as an Engineer Officer and as a civilian GS-13 Environmental Technical Expert), and from strategic level consulting in various business sectors related to energy and the environment. He has proven expertise in: scope development and management, requirements management, schedule development and management, risk identification and mitigation, stakeholder management, and communications planning and management.**

#### Education and Licensing

B.S. Environmental Engineering - United States Military Academy, West Point, NY

#### Sample Projects

**Confidential Refinery:** Serving as technical consultant for an internal refinery process improvement team evaluating various issues concerning operations and relations with neighbors and government agencies. Projects have included a quantitative & qualitative assessment of refinery-wide environmental issues resulting in a \$6.5MM process improvement program to reduce benzene emissions by 23%, risk identification and development of best management practices for high-risk process units, and development of a \$1.5MM community improvement program.

**Wind Energy Development:** Operated as an internal consultant to a private developer for construction of a multibillion-dollar 4,000 MW wind energy project and associated 150-mile transmission line. Responsible for subcontractor and sub-consultant management, preliminary design, regulatory assessment, stakeholder management, and the complete construction contractor request for proposal package (scope of work, design specifications, terms and conditions, and bid documents).

**Air Quality Permitting:** Managed and served as engineer for over four dozen air quality permit applications prepared for a wide variety of industrial source categories including power plants, refineries, natural gas storage and transmission facilities, and chemical and other manufacturing plants. The state and federal permit types included Title V, Prevention of Significant Deterioration, New Source Review, Oil & Gas Standard Permits, and Permits by Rule.

#### Department of Defense Research & Development:

Led the technical efforts for the Army's \$15MM "Safeguard Program" to evaluate the environmental, health, and safety impacts of novel materials being developed by the Department of Defense (DOD), and to assist material managers in understanding associated health exposure risks during all phases of a product's lifecycle. The first completed project of the

## Kyle Elliott

program included toxicity testing and evaluation of military-specific nanomaterials.

Defined, planned, and initiated a technology assessment and development study of alternative treatment solutions for explosive impacted wastewater in collaboration with a cross-functional team of government, industry, and educational institutions to scale emerging electrochemical treatment and alkaline hydrolysis technologies for use at Army Ammunition Plants. The \$15.5MM modernization program included development of process improvements via the use of Lean Six Sigma tools in the areas of process mapping, and cause and effects.

Provided embedded support to the DOD's Program Executive Officer for Ammunition to develop the business cases for over \$120 million of Congressional funding for over 30 ammunition manufacturing facility modernization projects.

**Environmental Remediation:** Served as program coordinator, project manager, project engineer or task lead for over two-dozen large scale environmental remediation projects in New York and New Jersey. Executed a wide range of project tasks including: requirements analysis, conceptual design, scope of work development, cost estimation, proposal writing, resource allocation, procurement planning, project scheduling, budget management, engineering, work plan and technical specification development, computer aided design and drafting, subcontractor request for proposal preparation, subcontractor evaluation and award, prime contract and multiple subcontract administration, public presentation and fact sheet development, risk management, construction oversight, stakeholder communications, and project documentation for state and federal regulatory requirements.

### Employment

*July 2015 – Present*

Senior Consultant; RSJ Consulting, LLC

*August 2008 – May 2015*

Senior Consultant; RPS Group (purchased JDC, LLC)

*September 2005 – August 2008*

Project Manager / Technical Expert; U.S. Army Armament Research Development and Engineering Center

*June 2003 – August 2005*

Project Manager / Environmental Engineer; GEI Consultants

*September 2002 – June 2003*

Project Manager / Environmental Engineer; TRC Environmental Corporation

*June 2000 – September 2002*

Project Manager / Environmental Engineer; Foster Wheeler Environmental Corporation (now Tetra Tech)

## Kyle Elliott

*June 1995 – June 2000*

Officer; United States Army

### Partial List of Clients

CITGO

Spectra Energy

Exide Technologies

South Hampton Resources, Inc.

Valero

TGS Group

Motiva

ExxonMobil

BASF

BP Capital

Baryonyx Corporation

Magellan Terminals Holdings

NRG

Nucor Steel

Oxbow Calcining LLC

National Grid

Keyspan Energy

CON EDISON

Summit Power Group

ConocoPhillips

NuStar Logistics

Copano Energy

# **Qualifications and Key Personnel**

**March 3, 2023**

**Tox Strategies**

# Contents

## **ToxStrategies Qualifications**

Our full range of services can be viewed on our website at  
<https://toxstrategies.com/services/>

## **ToxStrategies Key Personnel Curricula Vitae**

Jonathan Urban, PhD, DABT  
Mark Harris, PhD, MBA  
Laurie Haws, PhD, DABT, ATS  
Daniele Wikoff, PhD  
Julie Panko, CIH  
Camarie Perry, MS  
Liz Mittal, MS  
Jen Bare, BS  
Alex East, BS

# Overview of ToxStrategies' Qualifications



**ToxStrategies is a multidisciplinary scientific consulting firm that strives to develop innovative solutions to address the scientific, technical, and regulatory challenges confronting our clients. We have a reputation for applying sound science in all that we do, for leading-edge thinking, and for tailoring our approach to meet the specific needs of our clients, whether a rapid response or a comprehensive analysis is needed.**

## Toxicology

Experience includes systematic literature review; risk and safety assessment; derivation of toxicity criteria; design, placement, and oversight of toxicology studies; nanotechnology; neurotoxicology; reproductive and developmental toxicology.

### Computational Toxicology

Efficiently predict chemical toxicity and integrate high-throughput exposure and toxicity data into risk assessments. Study chemical mode of action, adverse-outcome pathways, dose-response relationships, susceptibility differences between individuals, uncertainty, and risk.

### Systematic Reviews and Evidence-Based Toxicology (EBT)

In the emerging field of EBT, apply scientific logic and systematic data evaluation to state-of-the-science hazard identification and classification, health effects causation, and disease management and prevention.

### Exposure Assessment

Practice areas include biomonitoring, bioaccessibility/bioavailability, dose reconstruction, exposure simulation, California Proposition 65, and exposures from natural gas exploration and development.

### Risk Assessment

Skill sets include deriving cleanup levels, dose-response modeling, exposure assessment, risk communication, uncertainty analyses, and quantitative microbial risk assessment.

### Endocrine Disruption

Assess the role of endocrine disruption in tumor development, validate endocrine disruptor assays, oversee Tier 1 assays, identify "Other Scientifically Relevant Information," place and monitor CRO assays, assess data for Tier 2 testing. Familiar with all aspects of EPA's Endocrine Disruptor Screening Program (EDSP).

### IARC Cancer Evaluation

Within the IARC Monograph Program, serve as meeting observer, support clients in preparing for evaluations and developing follow-up strategies, foresee data needs and develop strategies to fill gaps, and apply the Ten Key Characteristics of Carcinogens.

### GHS: OSHA and REACH/CLP

Ensure compliance with the EU's Registration, Evaluation, Authorization and Restriction of Chemical Substances (REACH) Regulation, as well as the UN's Globally Harmonized System (GHS), including the EU Classification, Labeling and Packaging of Substances and Mixtures (CLP) Regulation and the US OSHA revised Hazard Communication Standard (HCS).

### PBPK and IVIVE

Develop, apply, and evaluate high-throughput physiologically based pharma/toxicokinetic models, and *in vitro*-to-*in vivo* extrapolation models. Apply these computational methods to quantify relationships between exposures and toxicological responses. Results can facilitate drug discovery, product development, and chemical risk assessment.

## Industrial Hygiene

Chemical hazard assessments, occupational exposure level evaluation and development, comprehensive qualitative and quantitative exposure assessments, evaluation of strategies to control exposures, evaluation and development of exposure control strategies, and risk communication.

## Epidemiology

Rigorous scientific principles that guide our research on complex health conditions. With a focus on pharmaceuticals, medical devices, nutritional products, and environmental chemicals, our scientists aid clients in the conduct, evaluation, and interpretation of epidemiological studies. Our research frequently results in peer-reviewed publications and presentations at scientific conferences and is also used in numerous regulatory documents in the US and Europe.

ANN ARBOR, MI

AUSTIN, TX

HOUSTON, TX

PITTSBURGH, PA

ROCKVILLE, MD

ASHEVILLE, NC

CINCINNATI, OH

ORANGE COUNTY, CA

RESEARCH TRIANGLE PARK, NC

SAN FRANCISCO, CA

866.794.5840

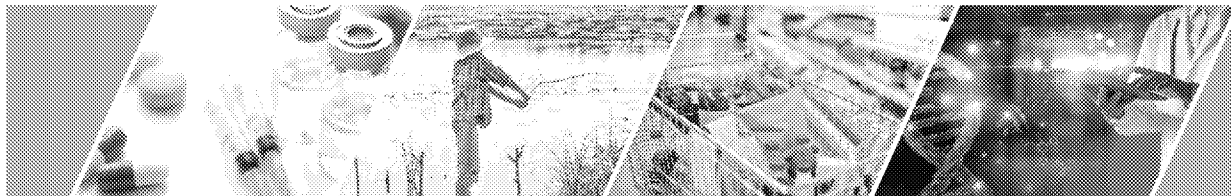
[www.toxstrategies.com](http://www.toxstrategies.com)

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# Overview of ToxStrategies' Qualifications Continued



## Air Quality & Exposure

Perform risk and hazard assessments, exposure reconstruction, and computational modeling of chemicals in air. Ensure regulatory compliance (including Prop 65), assess indoor vapor intrusion and ambient air quality, and conduct chemical fingerprinting.

## Product Stewardship and Green Chemistry

Assist in eliminating or substituting chemicals, reducing environmental impacts, and evaluating products' end-of-life impacts.

## Toxic Substances Control Act (TSCA)

Pre-prioritize clients' chemicals to predict their potential for listing on "high-priority" list and support challenges to new- and existing chemical and use prioritizations. Design and conduct risk evaluations, including systematic reviews of toxicology literature and weight-of-evidence analyses.

## Environmental Sciences

Develop and apply quantitative methods to model chemical fate and transport. Manage large data sets, integrate findings across media, use sophisticated tools to analyze data, and create data visualizations to communicate results to diverse audiences.

### Environmental Forensics, Cost Allocation

Determine sources and timing of contaminant releases using chemical, mineralogical, isotopic, DNA, and tree-ring fingerprinting techniques; build defensible evidence base for litigation; apportion liability for mitigation among multiple contributors.

### Risk Communication

Combine aspects of science, psychology, risk perception, and sociology to define personal consequences of a given exposure. Coordinate public outreach efforts and communicate complex scientific concepts to the lay public, media, and nontechnical parties involved in litigation.

### Liability Cost Analysis

Use accepted methods, validated cost data, and a probabilistic approach to uncertainty in cost projections to support clients' financial reporting, litigation and settlements, mergers & acquisitions, and corporate strategic planning.

## Biopharmaceuticals/Pharmaceuticals

Scientific and strategic expertise in nonclinical safety assessments of novel small-molecule and biological products and biosimilars. Includes designing/managing toxicology studies; IND, pre-IND, and BLA submissions; due diligence, and in-person and remote meetings with regulatory authorities.

### Toxicology Monographs

Board-certified toxicologists prepare monographs to document the safety or potential health hazards of product- and process-related impurities, degradants, solvents, and novel excipients in drug ingredients and products (e.g., biologics, cell therapies, small molecules).

### Neurotoxicology and Neuroscience

Design pre-clinical neurotoxicology protocols, oversee *in vivo* studies, interpret pre-clinical neurological data, and characterize the potential neurotoxicity of a drug.

## Product Safety

Assist with both routine and crisis-borne safety assessments of consumer goods and packaging. Smooth product path to the marketplace, supporting safety and regulatory needs. Includes support for medical devices and pharmaceuticals, and Proposition 65 compliance.

### Food and Supplement Safety

Support bringing new products and ingredients to the market and expanding existing uses. Develop health and technical product claims, conduct GRAS assessments, coordinate all phases of pre-clinical and clinical studies, ensure compliance with Food Safety Modernization Act.

### Animal Feed & Pet Food

Safety assessments to bring new products or ingredients to market or expand existing uses. Assess technical product claims and navigate the regulatory maze to secure approval. Prepare food additive petitions, AAFCO petitions, GRAS determinations, and other compliance-required materials.

### Global Product Stewardship

Synthesize regulatory compliance, human and environmental safety, and sustainability goals into responsible design, development, and management of products throughout their life cycle and value chain.

### California Proposition 65

California-based toxicologists calculate safe-harbor levels, conduct human-use simulations, and assess chemical exposures from food, consumer products/packaging, and medical devices.

ANN ARBOR, MI

AUSTIN, TX

HOUSTON, TX

PITTSBURGH, PA

ROCKVILLE, MD

ASHEVILLE, NC

CINCINNATI, OH

ORANGE COUNTY, CA

RESEARCH TRIANGLE PARK, NC

SAN FRANCISCO, CA

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# ToxStrategies Key Personnel

ToxStrategies employs >65 highly qualified scientists who are skilled in toxicology, epidemiology, exposure analysis, engineering, and biostatistical analyses. ToxStrategies staff members have extensive experience in characterizing potential health risks associated with exposures to compounds in a wide variety of consumer products, including cosmetics, food and feed ingredients, industrial settings, and environmental media.

CVs for key personnel, led by project manager Dr. Jonathan Urban, appear in the following order:

- Jonathan Urban, PhD, DABT
- Mark Harris, PhD, MBA
- Laurie Haws, PhD, DABT, ATS
- Daniele Wikoff, PhD
- Julie Panko, CIH
- Camarie Perry, MS
- Liz Mittal, MS
- Jen Bare, BS
- Alex East, BS

A full list of personnel can be viewed on our website at <https://toxstrategies.com/company/people/>.

# Jonathan D. Urban, Ph.D., DABT

MANAGING SCIENTIST

ASSOCIATE PRACTICE DIRECTOR, HEALTH SCIENCES

## CONTACT INFORMATION

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9390 Research Blvd, Suite 100  
Austin, TX 78759  
Phone (512) 351-7358  
[jurban@toxstrategies.com](mailto:jurban@toxstrategies.com)

## PROFESSIONAL PROFILE

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Dr. Jonathan Urban is a Managing Scientist and the Associate Director of the Health Sciences Practice with ToxStrategies, Inc., in Austin, TX. Dr. Urban is a board-certified toxicologist with more than fifteen years' experience studying and evaluating the potential health effects of a wide range of cosmetic and consumer product ingredients, raw materials and impurities, food-related compounds, and environmental and occupational chemicals of concern. He has extensive experience assessing potential human health risks associated with personal, occupational, and community-wide exposures to soil, water, and air contaminants, including chemical and petrochemical production activities. He specializes in the use of evidence-based methods in support of hazard and risk assessment and is involved in the firm's integration of these methods in the safety assessment development process. He has played an integral role in the firm's efforts to develop and apply comprehensive systematic review methods for chemical risk assessment, with experience in all aspects of systematic review including the use of critical appraisal tools for evaluating studies for risk of bias and external validity, as well as evidence integration. Dr. Urban has utilized this expertise in the development of critiques and recommendations regarding health-based toxicity criteria for both state and federal regulatory agencies, industry, and private-sector stakeholders. Dr. Urban also has extensive experience conducting both screening-level and complex site-specific risk assessments and has developed a comprehensive knowledge base on a variety of regulatory guidance documents on human health risk assessment. This experience has also facilitated work with regulatory agencies and potentially responsible parties on developing site cleanup standards. Additionally, Dr. Urban has experience in the drug development and food safety sectors, providing monitoring oversight for studies in support of the FDA's pre-IND application process for pharmaceuticals and conducting GRAS reviews for food additives, respectively.

Dr. Urban is a Diplomate of the American Board of Toxicology, has published academic and professional studies in the peer-reviewed literature, and is a reviewer for various scientific journals. While earning his Ph.D. in toxicology at the University of North Carolina at Chapel Hill, Dr. Urban served as an enlisted communications specialist in the United States Marine Corps Reserves (Communications Company, Greensboro, NC).

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**EDUCATION AND DEGREES EARNED**

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Ph.D., Toxicology, University of North Carolina at Chapel Hill, 2006

B.S., Biological Sciences, University of Maryland at College Park, 1999

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**PROFESSIONAL ASSOCIATIONS AND AWARDS**

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Diplomate of the American Board of Toxicology (since 2013; recertified 2018 and 2023)

Society of Toxicology (since 2004): 2006 Graduate Student Travel Award

Risk Assessment Specialty Section, SOT (since 2008)

Reproductive and Developmental Toxicology Specialty Section, SOT (since 2019)

Carcinogenesis Specialty Section, SOT (since 2021)

American College of Toxicology (2012-2014)

Society of Environmental Toxicology and Chemistry (2011)

Society for Neurosciences (student member 2003–2005)

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**PROFESSIONAL ACTIVITIES**

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2013 Co-chaired SOT Continuing Education Course: Approval of Biosimilar Monoclonal Antibodies: Scientific, Regulatory and Legal Challenges (AM04)

2016–2017 Scientific Review Panel (Invited Guest): National Library of Medicine's Hazardous Substances Data Bank. Meetings #97 (September 22–24, 2016) and #98 (January 12–14, 2017)

2017–2020 Scientific Review Panel (Permanent Member): National Library of Medicine's Hazardous Substances Data Bank.

2019-2023 Editorial board member: Toxicology Reports

2022-2024 Secretary/Treasurer for SOT's Carcinogenesis Specialty Section

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**SELECTED PEER REVIEW**

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[Web of Science ResearcherID: [I-5896-2019](#)]

*Environmental Toxicity and Chemistry*

*Toxicological Sciences*

*Food and Chemical Toxicology*

*Regulatory Toxicology and Pharmacology*

*Environment International*

*Environmental Science and Technology*

*Human and Experimental Toxicology*

*Molecular Pharmacology*

*Mutation Research/Genetic Toxicology and Environmental Mutagenesis*

*Neuropsychopharmacology*  
*Toxicology Reports*  
*Journal of Food Biochemistry*  
*Journal of Pharmacological and Experimental Therapeutics*

## SELECTED PROJECT EXPERIENCE

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### ***Toxicology and Risk Assessment***

Researched and composed sections on the characterization of dioxin toxicology, toxic equivalency factors, dioxin oral bioavailability, and risk characterization for risk assessments on behalf of stakeholders working with regulators at remediation sites.

Conducted and published a comprehensive human health hazard and cancer risk assessment on the ingestion of fish sampled from the Lower Passaic River. This evaluation was comprised more than 150 chemicals of potential concern, including PCDD/Fs, PCBs, metals, and several other organic compounds, and utilized peer-reviewed site-specific exposure and consumption data to reduce assessment uncertainty.

Analyzed toxicogenomics data from an *in vivo* bioassay that incorporated comprehensive dose-response study design to derive estimates of relative potency (REPs) for dioxin-like compounds, comparing these early-stage genomics-based REPs with those that had been reported using later stage endpoints (e.g., protein activity, pathological events, etc.).

Composed a state-of-the-science toxicology report in support of updating an outdated but commonly utilized reference dose (RfD) for copper based on chronic exposure scenarios. Critical human and animal studies were identified from a comprehensive review of the literature and used to develop an updated RfD. The report was submitted to a state environmental regulatory agency, and the recommendations made in this report led the agency to update the toxicity value they used to develop their risk-based environmental copper limits (e.g., Cu-contaminated soils).

In a project involving legacy antimony (Sb) smelter operations, performed extensive research on the toxicology and bioavailability of various forms of antimony, the results of which were submitted to a state environmental regulatory agency in the form of state-of-the-science reports. The recommendations made in these reports led the state regulatory agency to update the toxicity values they used to develop their risk-based environmental antimony limits (e.g., Sb-contaminated soils).

Evaluated the potential impact of toxicological effects in rodents observed in NTP's 2016 antimony trioxide (Sb<sub>2</sub>O<sub>3</sub>) inhalation bioassay report on state soil cleanup level using preliminary benchmark dose (BMD) analytical estimates of non-cancer and cancer endpoint potencies.

Project manager for the evaluation of perfluorononanoic acid (PFNA), 1,4-dioxane, and 1-methylnaphthalene toxicology in support of an effort to provide a state regulatory agency with state-of-the-science alternatives for deriving toxicity values to serve as the basis for establishing water criteria.

Managed and conducted an analytical assessment of PCNs, PCDD/Fs, and dioxin-like PCBs in based on sediment sampling for a prominent harbor water body in the Northeast United States. Used preliminary TCDD-based toxic equivalency factors (TEFs) for PCN congeners to characterize PCN contribution to overall sample TEQs. Employed PCA fingerprinting analyses to compare PCN congener profiles between sediment and technical mixtures in an effort to identify potential PCN sources.

Provided toxicological expertise in a comprehensive analysis of impacts to an urban area in North Texas from shale gas drilling and production.

Conducted comprehensive literature reviews on the human health effects of multiple nickel and lead compounds in support of the European Union's Registration, Evaluation & Authorisation of Chemicals (REACH) initiative, and populated the International Uniform Chemical Information Database (IUCLID) substance with relevant substance-specific data. Evaluated key studies for reliability and relevance, synthesized large volumes of data, and generated integrative reports.

### ***Systematic Review and Evidenced Based Toxicology***

Project manager on a large systematic review project for a state regulatory agency in which a systematic map of the PFAS health literature was created. From this literature mapping database, experimental animal and epidemiology studies potentially relevant to human health risk assessment were screened, extracted, and evaluated systematically using a protocol and study quality metrics based on USEPA's HAWC.

Applied systematic review concepts of internal, external and construct validity to a comprehensive evaluation of the *in vitro* literature reporting relative potency (REP) values for dioxin-like PCBs using various human cell models and AhR pathway endpoints. Following a weight-of-the-evidence integration and decision framework, this effort resulted in the application of a study relevance/quality weighting scheme to the updated REP database for PCB126 to inform an updated TEF for the DL-PCB congener.

Developed a comparative assessment of *in vitro* critical appraisal tools (ToxRTool, SciRAP, EPA-OPPT's TSCA tool) using published datasets generated from human and animal cell models in support of risk evaluation related to *in utero* exposures to trichloroethylene.

Conducted a risk-of-bias (RoB) assessment per the NTP-OHAT guidelines on the animal and human peer-reviewed studies that make up the database for the hypothesis that *in utero* exposure to TCE causes congenital heart defects.

Conducted systematic review of the relationship between sperm quality and pre- and perinatal dioxin exposures in human and animal studies. Utilized the NTP's Office of Health Assessment and Translation (OHAT) Risk of Bias Tool to evaluate epidemiology and *in vivo* studies. The resulting animal evidence base was integrated into a weighted, meta-regression analysis to characterize the dose-response relationship in rats.

Participated in evaluation for the improvement of the SciRAP *in vitro* critical appraisal tool, the product of a collaboration between the researchers at Stockholm University (Department of Environmental Science and Analytical Chemistry) and the Karolinska Institutet (Institute of Environmental Medicine).

Evaluated a systematic critical appraisal tool developed by the Department of Defense for evaluating non-cancer *in vivo* datasets in support of the development of an occupational exposure level (OEL). The appraisal system developed by the DoD is a fit-for-purpose approach that integrates elements of several available critical appraisal tools and is currently under NAS review.

Participated in systematic review effort for the update of caffeine risk assessment evaluating consumption levels associated with adverse effects in humans. Helped develop several endpoint-specific systematic review protocols, and developed and applied DistillerSR screening forms for populating evidence base for endpoints of concern. Utilized the NTP's Office of Health Assessment and Translation (OHAT) Risk of Bias Tool to evaluate epidemiology (experimental and observational) studies.

***Criteria Pollutants and Air Toxics***

Provided expert testimony in two state contested case hearings regarding the permitting of criteria and non-criteria pollutant emissions approved by the TCEQ for facilities in the chemical industry. Utilized air dispersion modeling and air monitoring analysis to characterize community exposures relative to USEPA's National Ambient Air Quality Standards (NAAQS) and TCEQ's Effects Screening Levels (ESLs) to address concerns about potential health effects.

Provided expertise in the areas of toxicology and risk assessment regarding the emissions from, and air monitoring of, two separate petrochemical facilities in support of TX state air permits that were under consideration for contested case hearings. In these efforts, risk assessment tools were applied to federal and state monitoring and emissions modeling data and used to develop public communication briefs for respective area residents who attended public meetings hosted by the state regulatory agency.

Managed the evaluation of emissions from a petrochemical facility in support of a state air permitting amendment. This project involved a comprehensive assessment of the occupational and toxicology peer-reviewed and gray literature, evaluation of federal and state monitoring and modeling tools (e.g., NATA, RSEI), coordination and drafting of an extensive summary report, and the communication of toxicology and risk information to area residents during a public meeting coordinated by state regulatory agency.

Investigated the proposed use of USEPA TCE RfC as a short-term/immediate remediation action level; reviewed animal toxicology, epidemiology, and toxicokinetic data on reproductive and developmental effects of TCE, specifically as it related to fetal cardiac malformations. Worked with a state agency to develop a health hazard-based and scientifically defensible level of concern for residential TCE exposures via vapor intrusion.

Provided toxicology support on a project in which regulatory modeled TCE air emission estimates associated with a facility's permitted TCE use raised concerns that potential residential exposures exceeded low level health-based air standards developed by the state regulatory agency.

***Occupational Health***

Managed a comprehensive toxicological evaluation of ortho-toluidine that led to the development of state of the science cancer risk-based exposure values recommended for updating federal occupational standards. This effort included a systematic evaluation of the relevant epidemiological database and utilized current human biomonitoring data and PBPK modeling to support the proposed alternative occupational exposure standards.

Managed and performed a Tier 3 risk assessment as provided in Missouri Risk-Based Corrective Action (MRBCA) guidance to evaluate potential worker exposures and health risks associated with VOC vapor intrusion at a manufacturing facility in the state. Utilized air monitoring data and job classification activities to characterize exposures and developed state-of-the-science toxicity factors to develop Tier 3 vapor intrusion screening levels protective of workers.

Coordinated and provided technical support for the development of strategies to reduce worker exposure to chemicals of potential concern at a primary magnesium production facility. Evaluated industrial hygiene and biomonitoring data for dioxin-like compounds and hexachlorobenzene relative to the general population, determining whether the measured levels posed a threat to worker health, and coordinated with a certified industrial hygienist to develop recommendations on improving occupational protocols and procedures.

Developed historical exposure reconstruction analysis of coke-oven workers exposed to the benzene-soluble fraction of total particulate matter present in coke-oven emissions. Exposure estimates were derived from regulatory and industrial personal and area monitoring efforts for each specific coke-oven job and were used to develop cumulative exposure and cancer risk estimates.

Conducted an extensive review of the reproductive and developmental toxicology and epidemiology literature of glycol ethers and their respective acetates identified in more than 100 products that represented potential exposure hazards to semiconductor facility employees. Occupational exposure was evaluated using historical industrial hygiene data, product purchasing data, and thousands of material safety data sheets (MSDSs). Hazard was assessed by comparing estimated exposures with toxicity criteria and regulatory exposure guidelines.

Performed a comprehensive toxicological review of various chemicals (VOCs, semi-volatile compounds, metals) identified in various industrial products and processes to which employees of a laminated plastics plant had potentially been exposed. In addition, employee symptoms and health complaints were compared with the toxicological profiles of each chemical of potential concern to focus the subsequent exposure assessment.

Assisted in biomonitoring analysis focused on exposures of former and current employees to dioxins and metals at copper smelter facilities. This work involved data analyses and interpretation regarding the levels of dioxin-like compounds in blood samples, the results of which were compared with the levels reported in other regional and national biomonitoring efforts to assess relative body burden.

### ***Consumer Products and Foods***

Provide support as a contract toxicologist for a large consumer products business conducting screening level and comprehensive safety assessments on pre-market product formulation constituents of a variety of grooming and beauty care cosmetics.

Managed and coordinated our firm's safety assessment support for a wide variety of cosmetic ingredients and raw materials for a cosmetics manufacturer. This role involved the refinement of a safety evaluation process reflective of the guidelines set by European Commission's Scientific Committee on Consumer Safety (SCCS), and the oversight and review of our team's safety assessors.

Conducted safety assessments on indoor and outdoor pest control products developed for international markets. The assessments were focused on potential maternal, fetal, and infant exposure scenarios and health outcomes.

Primary consulting toxicologist supporting multiple businesses in the development of product-level safety assessments for a series of nutrition products. This role involved review of draft product constituent assessments, and their integration into higher level assessments on the complete products for establishing consumer use recommendations.

Provided an internal assessment for a client on the potential human health risk associated with dermal exposures to an essential oil-based residential insecticide product, using QRA models published by the Research Institute for Fragrance Materials (RIFM) as well as the USEPA's residential pesticide exposure model.

Coordinated and managed subcontractor services providing toxicological guidance and expertise in support of an initiative by FDA's Center for Tobacco Products to develop risk assessments on unregulated tobacco products (e.g., electronic cigarettes). Comprehensive reviews of the peer-reviewed literature were conducted and distilled into summary documents for various tobacco-related chemicals (nicotine, tobacco-specific nitrosamines NNN and NNK, acrolein) and numerous tobacco product ingredients (flavor additive and enhancer compounds, and complex essential oils). In addition, we provided the client with dose-response modeling results on relevant studies of NNK carcinogenicity, and guidance on how to present such data in exposure-response arrays.

Managed the development of No Significant Risk Levels (NSRLs) for beta-myrcene based on the 2010 NTP bioassay report according to Proposition 65 regulatory guidance set forth by California's Office of Environmental Health Hazard Assessment (OEHHA).

Managed the development of an indoor air quality model toolkit for quantifying exposure and human health risk associated with trace volatile organic compounds present in the propellants used in consumer aerosols.



Researched and developed the safety sections of GRAS reports submitted to the U.S. Food and Drug Administration on non-caloric sweetener products.

Researched and published review manuscripts on the potential genotoxic and allergenic hazards related to consumption of highly purified, non-caloric sweetener products.

Served as an expert panel member for the GRAS evaluation of a high purity, non-caloric general-purpose sweetener.

Researched and drafted comments on the carcinogenicity or developmental/reproductive toxicity of pyrethroids (type 1 as a group and deltamethrin, respectively) for consideration by OEHHA Proposition 65 expert panels (DARTIC and CIC, respectively).

Conducted comprehensive investigation into the mechanistic and empirical evidence supporting a potential association between certain food preservatives (sodium benzoate, parabens) with neurodegenerative disease.

Developed risk-based toxicity values for acrylamide based on extensive review of the literature and National Toxicology Program's cancer bioassay data.

Provided toxicology analysis for a human health risk assessment related to a detergent contaminant (nonylphenol ethoxylate) found at low levels in a product marketed for consumption. Integral to this assessment was the identification of a toxicological effects level used to develop a health benchmark and the calculation of exposure estimates, key determinants in decisions related to product shelf retention.

### ***Pharmaceuticals and Drug Development***

Visited the campuses of several different CROs to conduct site monitoring of pre-clinical toxicology studies, including the dosing, handling and care of non-human primates, rabbits, and rodents. These were performed in support of investigational new drug (IND) application efforts for biological drug development. Responsibilities included evaluating CRO staff knowledge and adherence to proscribed treatment protocols, as well as general observations on laboratory conditions and laboratory feedback from regulatory agency inspections.

Provided toxicology and pharmacology expertise in support of a pre-IND application for a novel vaccine. Involved interpreting toxicology and pharmacology study data and facilitating sponsor and laboratory communication on study results and future study design.

Researched and developed a comprehensive summary of the toxicology data on an over-the-counter antihistamine pharmaceutical being considered for inclusion in a novel therapeutic formulation.

Conducted toxicological evaluations of chemical substances present or potentially present in vaccines, as well as derived safe levels for excipients, detergents, surfactants, and other chemicals utilized in the production or inactivation of vaccine products.

Designed and performed *in vitro* assays to evaluate the diverse G-protein coupled receptor-based binding and signaling profiles of several dopaminergic ligands, with a focus on atypical antipsychotic drugs and non-clinical development of novel Parkinson's Disease pharmacotherapies.

## **PUBLICATIONS**

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Wikoff DS, **Urban JD**, Ring C, Britt J, Fitch S, Budinsky R, Haws LC. 2021. Development of a range of plausible non-cancer toxicity values for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) based on effects on sperm count:

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**Urban JD**, Wikoff DS, Chappell GA, Harris C, Haws LC. 2020. Systematic Evaluation of Mechanistic Data in Assessing In Utero Exposures to Trichloroethylene and Development of Congenital Heart Defects. *Toxicol* 436:152427. doi:10.1016/j.tox.2020.152427.

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Wikoff D, Welsh BT, Henderson R, Brorby GP, Britt J, Myers E, Goldberger J, Lieberman HR, O'Brien C, Peck J, Tenebein M, Weaver C, Harvey S, **Urban J**, Doepker C. 2017. Systematic review of the potential adverse effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. *Food Chem Toxicol* 109(Pt1):585–648.

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Bunch AG, Perry CS, Abraham L, Wikoff DS, Tachovsky JA, Hixon JG, **Urban JD**, Harris MA, Haws LC. 2014. Evaluation of impact of shale gas operations in the Barnett Shale region on volatile organic compounds in air and potential human health risks. *Sci Tot Environ* 468–469:832–842.

**Urban JD**, Wikoff DS, Bunch AT, Harris MA, Haws LC. 2014. A review of background dioxin concentrations in urban/suburban and rural soils across the United States: Implications for site assessments and the establishment of soil cleanup levels. *Sci Tot Environ* 446–467:586–597.

Rowlands JC, Budinsky R, Gollapudi B, Black M, Wolfinger R, Cukovic D, Dombkowski A, Thompson C, **Urban JD**, Thomas R. 2013. A genomics-based analysis of relative potencies of dioxin-like compounds in primary rat hepatocytes. *Toxicol Sci* 136(2):595–604.

**Urban JD**, Carakostas MC, Brusick, DJ. 2013. Steviol glycoside safety: Is the genotoxicity database sufficient? *Food Chem Toxicol* 51:386–390.

Fowler JC, Bhattacharya S, **Urban JD**, Vaidehi N, Mailman RB. 2012. Receptor conformations involved in dopamine D2L receptor functional selectivity induced by selected transmembrane 5 serine mutations. *Mol Pharmacol* 81(6):820–831.

Thompson CM, Hixon JG, Proctor DM, Haws LC, Suh M, **Urban JD**, Harris MA. 2012. Assessment of genotoxic potential of Cr(VI) in the mouse duodenum: An in silico comparison with mutagenic and nonmutagenic carcinogens across tissues. *Regul Toxicol Pharmacol* 64(1):68–76.

**Urban JD**, Budinsky RA, Rowlands JC. 2012. An evaluation of single nucleotide polymorphisms in the human heat shock protein 90kDa alpha and beta isoforms. *Drug Metab Pharmacokinet* 27(2):268–278.

Rowlands JC, **Urban JD**, Wikoff DS, Budinsky RA. 2011. An evaluation of single nucleotide polymorphisms in the human aryl hydrocarbon receptor-interacting protein (AIP) gene. *Drug Metab Pharmacokinet* 26(4):431–439.

Tichomirowa MA, Bariler A, Daly AF, Jaffrain-Rea M-L, Ronchi CL, Yaneva M, **Urban JD**, Petrossians P, Elenkova AP, Tabarin A, Desailoud R, Maiter D, Schürmeyer T, Cozzi R, Theodoropoulou M, Sievers C, Bernabeu I, Naves LA, Chabre O, Fajardo Montañana C, Hana V, Halaby G, Delemer B, Labarta JI, Sonnet E, Ferrandez A, Hagelstein MTs, Caron P, Stalla GK, Bours V, Zacharieva S, Spada A, Brue T, Beckers A. 2011. High prevalence of AIP gene mutations following focused screening in young patients with sporadic pituitary macroadenomas. *Eur J Endocrinol* 165(4):509–515.

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**Urban JD**, Tachovsky JA, Staskal DF, Haws LC, Harris MA. 2009. Assessment of human health risks posed by consumption of fish from the Lower Passaic River, New Jersey. *Sci Tot Environ* 408(2):209–24.

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## PROTOCOLS

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caffeine consumption in healthy adults, pregnant women, adolescents, and children. PROSPERO 2015:CRD42015026609 Available from [http://www.crd.york.ac.uk/PROSPERO/display\\_record.asp?ID=CRD42015026609](http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015026609)

Wikoff D, Doepker C, Welsh B, Harvey S, Goldberger J, Lieberman H, Myers E, O'Brien C, Peck J, Tenebein M, **Urban J**, Weaver C. 2015. Systematic review of the adverse reproductive and developmental effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. PROSPERO 2015:CRD42015026736 Available from [http://www.crd.york.ac.uk/PROSPERO/display\\_record.asp?ID=CRD42015026736](http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015026736)

Wikoff D, Doepker C, Welsh B, Harvey S, Goldberger J, Lieberman H, Myers E, O'Brien C, Peck J, Tenebein M, **Urban J**, Weaver C. 2015. Systematic review of acute adverse effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. PROSPERO 2015:CRD42015026704 Available from [http://www.crd.york.ac.uk/PROSPERO/display\\_record.asp?ID=CRD42015026704](http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015026704)

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## INVITED LECTURES AND PRESENTATIONS

**Urban, J.D.**, K. Burkhalter, J.A. Tachovsky, C. Thompson, L.C. Haws, and M.A. Harris. 2010. Evaluation of Polychlorinated Naphthalenes (PCNs) in Newark Bay Sediment. Presented during the Dioxin-Like Compounds in Urban Waterbodies Session at the 30<sup>th</sup> International Symposium on Halogenated Persistent Organic Pollutants. September 14, 2010. San Antonio, Texas.

**Urban, J.D.** and R.B. Mailman. 2005. Functional selectivity as a mechanism of action for newer atypical antipsychotic drugs. Presented at: Merck, West Point, Pennsylvania.

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## ABSTRACTS AND PRESENTATIONS

Brown L, McMillan D, **Urban J**, Mihalchik A. 2023. A Tiered-Approach for Assessing the Safety of Polymeric Ingredients in Cosmetics and Personal Care Products. Presented at the 62<sup>nd</sup> Annual Meeting of Society of Toxicology. March 19-23, 2023. Nashville, TN. Abstract #3480-P605.

**Urban J**, Wikoff D, Haws L. 2022. Application of Risk of Bias for Environmental Epidemiology Evidence Characterization and Integration in Support of Risk Assessment: A case study evaluating the relationship between exposure to dioxin-like compounds (DLCs) and sperm count. Presented at the National Academy of Sciences, Engineering and Medicine's Workshops to Support EPA's Development of Human Health Assessments: Triangulation of Evidence in Environmental Epidemiology. May 9 and 11, 2022. (Hosted virtually).

Wikoff DS, Edwards S, Angrish M, Baumgartner P, Bever JB, Borghoff S, Chappell G, Chew R, Fitch S, Hench G, Hamernik K, Henderson D, Kirk A, Lea I, Mandel M, Payne L, Shapiro A, **Urban J**, Williams D, Markey K. 2021. Application of systematic methods to characterize thyroid adverse outcome pathways (AOPs). Presented at the American Society for Cellular and Computational Toxicology 2021 Annual Meeting. October 12-14, 2021. Virtual Meeting.

**Urban JD**, Wikoff DS, Chappell GA, Haws LC. 2020. A systematic evaluation of the mechanistic data relevant to *in utero* exposures to trichloroethylene and the development of congenital heart defects. Presented at the Society of Risk Analysis 2020 Annual Meeting. December 13-17, 2020. Virtual Meeting.

**Urban JD**, Wikoff DS, Fitch S, Ring CL, Haws LC, Harris MA. 2019. An assessment of the relative potency of the dioxin-like polychlorinated biphenyl PCB126: Are the human *in vitro* studies sufficient? Presented at the 39<sup>th</sup> International Symposium on Halogenated Persistent Organic Pollutants. August 25-30, 2019. Kyoto, Japan.

**Urban JD**, Wikoff DS, Fitch S, Ring CL, Haws LC, Harris MA. 2019. An Evaluation of the Utility of Human Cell Models for Characterizing Relative Potency for Dioxin-like Compounds. Presented at the IUTOX 15<sup>th</sup> International Congress of Toxicology (ICTXV). July 15-18, 2019. Honolulu, HI. Abstract #0948.

**Urban JD**, Wikoff DS, Haws LC. 2019. Three-tiered approach to integrating evidence streams assessing gestational trichloroethylene exposure and congenital heart defects (TCE-CHD). Presented at the National Academy of Sciences, Engineering and Medicine Workshop: Evidence Integration in Chemical Assessments: Challenges Faced in Developing and Communicating Human Health Effect Conclusions. June 3-4, 2019. Washington DC.

**Urban JD**, Wikoff D, Suh M, Britt J, Fitch S, Chappell G, Haws LC. 2019. Comparison of NTP OHAT and USEPA TSCA Study Quality Criteria - Trichloroethylene (TCE) and Congenital Heart Defects (CHDs) as a Case Study. Presented at the 58<sup>th</sup> Annual Meeting of Society of Toxicology. March 10-14, 2019. Baltimore, MD. Abstract #2801-P305.

Ring CL, **Urban JD**, Wikoff D, Thompson CM, Budinsky RA, Haws LC. 2019. Application of Systematic Review and Quantitative Evidence Integration Methods to Support Risk Assessment: Characterization of the Dose-Response Relationship between Exposure to Dioxin-Like Compounds (DLC) and Sperm Count. Presented at the 58<sup>th</sup> Annual Meeting of Society of Toxicology. March 10-14, 2019. Baltimore, MD. Abstract #3492-P288.

Wikoff D, **Urban J**, Chappell G, Haws LC. 2018. Application of Mechanistic Data Quality Criteria in Assessment of the Relationship Between Congenital Heart Defects and TCE Exposure – A Case Study. Presented at the National Academy of Sciences, Engineering and Medicine Workshop: Strategies and Tools for Conducting Systematic Reviews of Mechanistic Data to Support Chemical Assessments. December 10-11, 2018. Washington DC.

Wikoff D, Ring CL, Thompson C, **Urban J**, Budinsky RA, Haws LC. 2018. Characterization of the dose-response relationship for TCDD and changes in sperm concentration in rats using meta-regression: A feasibility assessment of quantitative evidence integration techniques. Presented at the 38<sup>th</sup> International Symposium on Halogenated Persistent Organic Pollutants. August 26-31, 2018. Krakow, Poland.

**Urban JD**, Harvey S, Wikoff D, Haws LC. 2018. Assessment of Study Quality (Risk of Bias) in Understanding the Relationship Between Congenital Heart Defects (CHDs) and Exposures to Trichloroethylene (TCE). Presented at the 57<sup>th</sup> Annual Meeting of Society of Toxicology. March 11-15, 2018. San Antonio, TX. Abstract # 2842-P365.

Borghoff SJ, Wikoff D, **Urban JD**, Rager JE. 2018. A Systematic Approach to Identify Plausible Mode-of-Actions (MOAs) for an Increased Incidence of Lung Tumors in Mice with Chronic Exposure to 4-Methylimidazole (4-MEI). Presented at the 57<sup>th</sup> Annual Meeting of Society of Toxicology. March 11-15, 2018. San Antonio, TX.

**Urban JD**, Thompson CM, Plunkett LM, Perry CS, Haws LC. 2015. A state of the science copper reference dose for soil remediation. Presented at the Society of Toxicology's 54<sup>th</sup> Annual Meeting, March 22–26, 2015. San Diego, CA.

**Urban JD**, Perry C, Wikoff D, Abraham L, Harris MA. 2015. Lower Passaic River RM0-8: An alternative human health risk assessment. Presented at the 8<sup>th</sup> International Conference on Remediation and Management of Contaminated Sediments. January 12-15, 2015. New Orleans, LA. Abstract # 272.

Abraham L, Harris MA, Perry C, **Urban JD**, Wikoff D, Kinnell JC, Bingham M, Hickman S. 2015. Lower Passaic River RM0-8: An alternative preliminary remediation goal. Presented at the 8<sup>th</sup> International Conference on Remediation and Management of Contaminated Sediments. January 12-15, 2015. New Orleans, LA. Abstract # 187.

**Urban JD**, Doepker CL, Cuellar-Kingston N, van de Ligt J, Carakostas M. 2014. Do highly purified steviol glycoside sweeteners cause food allergies? Presented at the Society of Toxicology's 53<sup>rd</sup> Annual Meeting, March 23–27, 2014. Phoenix, AZ.

**Urban JD**, Thompson CM, Deskin R, Waite M, Haws LC. 2013. Development of an oral cancer slope factor for acrylamide based on tumors relevant to humans. Presented at the 52nd Annual Meeting of Society of Toxicology. March 10–14, 2013. San Antonio, TX. Abstract #2221-419.

**Urban J**, Rowlands JC, Budinsky R, Dombkowski A, Thompson CM, Thomas R. 2012. A genomics-based benchmark dose analyses of relative potencies of dioxin like compounds in primary rat hepatocytes. Presented at the 51st Annual Meeting of Society of Toxicology. March 11–15, 2012. San Francisco, CA. Abstract # 1726. [Top 10 abstract in SOT Risk Assessment Specialty Section.]

Perry C, Tachovsky JA, Ke M, **Urban J**, Haws L. 2012. Natural gas exploration and production in the Barnett Shale: Assessment of exposures to volatile organic compounds (VOCs). Presented at the 51st Annual Meeting of Society of Toxicology. March 11–15, 2012. San Francisco, CA. Abstract # 108.

Rowlands JC, Budinsky R, Gollapudi B, Cukovic D, Salagrama S, Dombkowski A, **Urban J**, Thompson C, Thomas R. 2011. An evaluation of relative changes in genomic gene expression in primary rat hepatocytes exposed to TCDD, 4-PeCDF, and TCDF. Presented at the 31st International Symposium on Halogenated Persistent Organic Pollutants. August 21–25, 2011. Brussels, Belgium.

Rowlands JC, **Urban J**, Wikoff DS, Budinsky R. 2011. The presence and estimated functional effect of single nucleotide polymorphisms at the AIP, ARNT, HSP90AA1, and HSP90AB1 loci in the human population. Presented at the 31st International Symposium on Halogenated Persistent Organic Pollutants, August 21–25, 2011. Brussels, Belgium.

Thomas RS, Rowlands JC, Budinsky RA, Thompson CM, **Urban JD**, Dombkowski A. Genomic approaches for relative potency assessment. Presented at the 31st International Symposium on Halogenated Persistent Organic Pollutants. August 21–25, 2011. Brussels, Belgium.

Budinsky R, **Urban J**, Rowlands JC. An evaluation of single nucleotide polymorphisms in the human aryl hydrocarbon receptor nuclear translocator gene. Presented at the Society of Toxicology's 50th Annual Meeting, March 6–10, 2011. Washington, D.C.

Fitzgerald L, Burkhalter B, **Urban J**, Staskal D, Harris M, Haws L. VOC serum levels in the general U.S. population: An analysis of the 2003-2004 NHANES dataset. Presented at the Society of Toxicology's 50th Annual Meeting, March 6–10, 2011. Washington, D.C.

**Urban J**, Fitzgerald L, Burkhalter B, Staskal D, Harris M, Haws L. BTEX serum levels in the general U.S. population: An analysis of 2003-2004 NHANES dataset. Presented at the Society of Toxicology's 50th Annual Meeting, March 6–10, 2011. Washington, D.C.

Haws L, Tachovsky JA, Staskal-Wikoff D, Aylward L, Burkhalter B, **Urban J**, Simon T, Harris M. 2010. An evaluation of the influence of different soil cleanup levels on the concentration of dioxin-like compounds in human serum. Presented at the 30th International Symposium on Halogenated Persistent Organic Pollutants. September 12–17, 2010. San Antonio, TX.

**Urban J**, Burkhalter B, Tachovsky JA, Haws L, Harris M. Evaluation of polychlorinated naphthalenes (PCNs) in Newark Bay sediment. Presented at the 30th International Symposium on Halogenated Persistent Organic Pollutants. September 12–17, 2010. San Antonio, TX.

Harris M, Tachovsky JA, Staskal-Wikoff D, Simon T, Burkhalter B, **Urban J**, Haws L. Assessment of the impact of various soil cleanup levels on serum concentrations of dioxin-like compounds in humans. Presented at the 49th Annual Meeting of Society of Toxicology. March 7–11, 2010. Salt Lake City, Utah.

Tachovsky A, Staskal D, **Urban J**, Harris MA, Haws L. Assessment of environmental data collected in a community with numerous petroleum refining and petrochemical facilities. Presented at the 49th Annual Meeting of Society of Toxicology. March 7–11, 2010. Salt Lake City, Utah.

**Urban JD**, Tachovsky JA, Staskal DF, Haws LC, Harris MA. Human health risk assessment of consumption of fish from the Lower Passaic River. Presented at the 48th Annual Meeting of Society for Toxicology. March 15–19, 2009. Baltimore, MD.

**Urban JD**, Haws LC, Staskal DF, Scott LF, Scott PS, Tachovsky AT, Unice KM, Harris MA. 2008. A framework for evaluating serum dioxin data derived from biomonitoring studies. Presented at the 28th International Symposium on Halogenated Persistent Organic Pollutants. August 17–22, 2008. Birmingham, England.

**Urban JD**, Haws LC, Scott LF, Scott PS, Staskal DF, Tachovsky AT, Unice KM, Harris MA. 2008. A framework for evaluating serum dioxin data derived from biomonitoring studies. Presented at the 47<sup>th</sup> Annual Meeting of Society for Toxicology. March 16–20, 2008. Seattle, WA. Abstract # 1198–637.

**Urban JD**, Thornley K, Wightman RW, Mailman RB. Pharmacological characterization of the N27-D2L cell line: Assessment as a viable cell model for investigating D2L receptor dopaminergic-coupled functions. Presented at the 46<sup>th</sup> Annual Meeting of Society for Toxicology. March 25–29, 2007. Charlotte, NC. Abstract # 1058–231.

Fuhrmann K, **Urban J**, Mailman R. 2006. TM5 serines effect on D<sub>2L</sub> dopamine receptor partial agonist pharmacology: Elucidating functional selectivity. Presented for the 2006 Summer Undergraduate Research Experience, University of North Carolina, Chapel Hill, NC. July 26, 2006.

**Urban JD**, Jin J, Mailman RB. 2006. N27 dopaminergic cell line: A useful model for studying the mechanisms of action of functionally selective dopaminergic compounds. Presented at the 45<sup>th</sup> Annual Meeting of Society for Toxicology. March 5–9, 2006. San Diego, CA. Abstract # 1374.

**Urban JD**, Mailman RB. Characterization of the N27 dopaminergic cell line as a model for elucidating the actions of functionally selective dopaminergic ligands. Presented at the 35<sup>th</sup> Annual Neuroscience Meeting. November 12–16, 2005. Washington, DC. Abstract # 32.21.

**Urban JD**, Mailman RB. 2005. Functional selectivity as a mechanism of action for newer atypical antipsychotic drugs. Presented at: Merck, West Point, Pennsylvania, USA.

**Urban JD**, Gay, Mailman RB. Functional selectivity as a mechanism of action of newer atypical antipsychotic drugs. Presented at the 34<sup>th</sup> Annual Neuroscience Meeting. October 23–27, 2004. San Diego, CA. Abstract # 163.4.

**Urban JD**, Gay EA, Mailman RB. 2004. Decreased neurological side-effects with aripiprazole: A result of functional selectivity of the D2 receptor? Presented at the 43<sup>rd</sup> Annual Meeting of Society for Toxicology. March 21–25, 2004. Baltimore, MD. Abstract # 313.

## SELECTED CONTINUING EDUCATION

Embryology and Developmental Toxicity Testing. Society of Toxicology. March 13, 2016.

Human Health Risk Assessment: A Case Study Application of Principles. Society of Toxicology. March 13, 2016.

Adverse Outcome Pathway (AOP) Development and Evaluation. Society of Toxicology. March 13, 2016.

Gonadal Development, Function, and Toxicology. Society of Toxicology. March 10, 2013.

Approval of Biosimilar Monoclonal Antibodies: Scientific, Regulatory and Legal Challenges. Society of Toxicology. March 10, 2013.

Best Practices for Developing, Characterizing, and Applying Physiologically Based Pharmacokinetic Models in Risk Assessment. Society of Toxicology. March 6, 2011.

Beyond Science and Decisions: From Problem Formulation to Dose-Response. Workshop I. Alliance for Risk Assessment. March 16-18, 2010.

Epidemiology for Toxicologists: Introduction. Society of Toxicology. March 16, 2008.

Dose Response Modeling for Occupational and Environmental Risk Assessment. Society of Toxicology. March 16, 2008.

Allergy and Allergic Disease: A Primer for Toxicologists. Society of Toxicology. March 25, 2007.

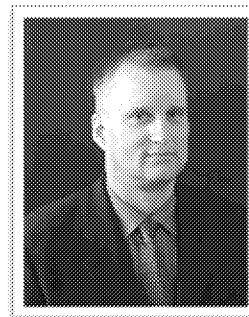
Neuropathology for the Toxicologist. Society of Toxicology. March 5, 2006.

Essentials of Metal Toxicology. Society of Toxicology. March 5, 2006



# Mark Harris, Ph.D., M.B.A.

MANAGING PRINCIPAL SCIENTIST



## CONTACT INFORMATION

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23501 Cinco Ranch Blvd, Suite B226  
Katy, TX 77494  
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fax (832) 218-2756  
[mharris@toxstrategies.com](mailto:mharris@toxstrategies.com)

## PROFESSIONAL PROFILE

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Dr. Mark Harris is a cofounder of ToxStrategies and has more than 25 years of experience in the areas of toxicology, human health risk assessment, and risk-based site investigations. He routinely applies his skills as a toxicologist and human health risk assessor to many types of projects, including designing, placing, and overseeing toxicology laboratory studies; and developing state-of-the-science toxicity values via the application of both default and more rigorous approaches such as benchmark modeling, application of weight-of-evidence techniques, and consideration of mode-of-action information. Other project experience includes estimating human exposures using a variety of approaches, including designing, implementing, and using data from biomonitoring studies; using complex data sets such as NHANES and conducting studies to gather human exposure information; modeling uptake and exposure via a variety of exposure pathways; and conducting both screening-level and complex site-specific risk assessments to quantify human health risks, including conduct of probabilistic risk assessments. Dr. Harris has a strong understanding of a wide variety of regulatory guidance documents that focus on human health risk assessment. He has substantial experience in dealing with regulatory agencies, ranging from implementation of administrative orders to developing site cleanup standards. Additionally, Dr. Harris has extensive experience in developing risk-based site investigations for both industrial and residential sites and in conducting source identification studies using both chemical fingerprinting techniques and historical records searches.

Dr. Harris is a co-author of more than 65 scientific journal articles and has participated in numerous technical seminars. He is a peer reviewer for several scientific journals, including the *Journal of Soil and Sediment Contamination*, *Integrated Environmental Assessment and Management (IEAM)*, the *Journal of Air and Waste Management*, and *Environmental Science and Technology (ES&T)*.

## EDUCATION AND DEGREES EARNED

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1990 Texas A&M University, Ph.D., Toxicology  
2000 Southern Methodist University, MBA  
1986 Texas A&M University, B.S., Biochemistry

## PROFESSIONAL ASSOCIATIONS

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American Chemical Society (ACS)  
Society of Environmental Toxicology and Chemistry (SETAC)  
Society of Risk Analysis (SRA)

## CERTIFICATIONS AND COURSES

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2002 Texas Risk Reduction Program (GSI Training Course)  
2000 Hazardous Waste Shipping, DOT Regulation Compliance  
1997 Spanish Language Immersion (Thunderbird University)  
1992 OSHA Hazardous Waste Operations  
1988 Molecular Endocrinology/Hormone Action

## PROFESSIONAL HONORS/AWARDS

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1990–1991 Outstanding Doctoral Research Award, Texas A&M University  
1990 Outstanding Graduate Student Award, College of Veterinary Medicine, Texas A&M University  
1989 George T. Edds Award for Graduate Student Research, College of Veterinary Medicine, Texas A&M University

## SCIENTIFIC ADVISORY PANELS, COMMITTEES, & WORKGROUPS

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2000 United States Environmental Protection Agency (USEPA) Expert Panel to evaluate Chapter 9 (Toxic Equivalency Factors) and Integrated Risk Characterization and Summary Section of Dioxin Reassessment (prepared by USEPA, July 2000)

## PROFESSIONAL EXPERIENCE

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Provided an expert report evaluating potential health effects associated with inhalation exposure to diacetyl incurred by an employee of a flavor manufacturer.

Evaluated a risk assessment prepared by a regulatory agency involving volatile organic chemicals and metals and potential exposure via inhalation by individuals living and working near a waste-handling facility. Prepared a rebuttal expert report describing shortcomings of regulatory agency approach to evaluating potential health risks.

Co-investigator of a study evaluating the mode of action of hexavalent chromium following oral exposure in rodents.

Managed the preparation of a human health risk assessment evaluating exposure via the fish ingestion pathway. The site was a large river in the northeastern United States. Risks associated with metals, PAHs, pesticides, PCBs, and PCDD/Fs were determined.

Co-principal investigator on a large biomonitoring study designed to assess the levels of dioxin-like compounds in the blood serum of workers at a former secondary copper smelting facility. This involved overseeing the development of the study protocol and comprehensive exposure questionnaire, study implementation, development of applicable background blood levels, fingerprinting analyses, data analyses, and interpretation of study findings. In addition, this project involved coordinating with an external Science Advisory Board and an Institutional Review Board.

Managed the design, implementation, and data analysis of a wild and farm-raised catfish sampling program in southern Mississippi. Chemical analyses included PCDD/Fs, dioxin-like PCBs, total PCBs, and PBDEs.

Evaluated the human health risk associated with a consumer food product contaminated by a non-food-grade lubricant. Conducted assessments specific to children's exposure in multiple countries around the globe in which the food product was sold, to aid the client with their implementation of a health-protective strategy to eliminate exposure to the contaminated product.

Evaluated PCB surface soil contamination at six softball fields within a larger recreational facility in Texas. Made recommendations regarding the continued use of the softball fields given the presence of PCBs. Additionally, developed a statistically based soil sampling plan for other areas of the park that were found to contain PCBs.

Reviewed PCDD/F and metal analyses of soils collected outside of a major industrial facility in southern Mississippi following the landfall of Hurricane Katrina, to determine whether these chemicals/metals posed any threat to human health and the environment.

Managed a large, multi-site RI/FS/Remediation in the northeastern United States, which resulted in the expedited closure of 18 industrial sites that contained varying quantities and concentrations of hexavalent chromium. This project involved characterizing affected environmental media, including soils, groundwater, surface water, sediments, and air; conducting a site-specific exposure assessment; developing site-specific hexavalent chromium cleanup standards, and developing and implementing various innovative remediation technologies for addressing hexavalent chromium.

Conducted a county-wide PRP search for industrial dischargers into a former publicly owned treatment works (POTW), to assist the client with the cost of investigation and remediation of the POTW and surrounding land. This project involved the review of historical records, search of various electronic databases, and interviews with knowledgeable individuals from the time period when the POTW operated.

Participated in a third-party review of a human health risk assessment on a former pentachlorophenol wood preservative site in Arkansas. Reviewed the calculations, assumed exposure pathways and conclusions, and made recommendations to the client for modifications to improve the assessment.

Assisted a client on the U.S. West Coast in an environmental-damage lawsuit brought by the National Oceanic Atmospheric Administration (NOAA) involving the discharge of PCBs into a POTW. Specifically, this effort involved utilizing historical data to estimate the amount of PCBs discharged by the client to the POTW that actually reached the environment.

Assisted in the development of chemical fingerprints for various sources of polychlorinated dibenzo-p-dioxins in a large urban river in the eastern United States.

Developed a surface water sampling plan and prepared a preliminary human health risk assessment for pathogens (bacteria, viruses, and parasites) discharged from a combined sewer overflow in a large urban river in the eastern United States.

Provided an expert report evaluating potential health effects associated with alleged exposure to benzene and hydrogen sulfide by employees of a wastewater treatment plant.

Prepared an expert report evaluating PCDD/F concentrations in surface soils adjacent to a large lake in East Texas. Compared the PCDD/F data to known local background concentrations of PCDD/Fs to demonstrate that the surface soils adjacent to the lake were not impacted by industrial operations.

## MANUSCRIPTS

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Bhat VS, Cohen SM, Gordon EB, Wood CE, Cullen JM, **Harris MA**, Proctor DM, Thompson CM. 2020. An adverse outcome pathway for small intestinal tumors in mice involving chronic cytotoxicity and regenerative hyperplasia: A case study with hexavalent chromium, captan, and folpet. *Crit Rev Toxicol* (open access), <https://doi.org/10.1080/10408444.2020.1823934>.

Thompson CM, Donahue DA, Hobbs C, Costecalde Y, Franzen A, Suh M, Proctor DM, **Harris MA**. 2020. Exposure to environmentally-relevant concentrations of hexavalent chromium does not induce ovarian toxicity in mice. *Regul Toxicol Pharmacol* 116, open access: <https://doi.org/10.1016/j.yrtph.2020.104729>.

Chappell G, Rager J, Wolf J, Babic M, Leblanc, Ring C, **Harris MA**, Thompson CM. 2019. Comparison of gene expression responses in the small intestine of mice following exposure to three carcinogens using the S1500+ gene set informs a potential common adverse outcome pathway. *Toxicol Pathol* 47(7):851–864, <https://doi.org/10.1177/0192623319873852>.

Klaren WD, Ring C, **Harris MA**, Thompson CM, Borghoff S, Sipes NS, Hsieh J-H, Auerbach SS, Rager JE. 2018. Identifying attributes that influence *in vitro*-to-*in vivo* concordance by comparing *in vitro* Tox21 bioactivity versus *in vivo* DrugMatrix transcriptomic responses across 130 chemicals. *Toxicol Sci kfy220*, available at <https://doi.org/10.1093/toxsci/kfy220>.

Thompson CM, Kirman CR, Hays SM, Suh M, Harvey SE, Proctor DM, Rager JE, Haws LC, **Harris MA**. 2018. Integration of mechanistic and pharmacokinetic information to derive oral reference dose and margin-of-exposure values for hexavalent chromium. *J Appl Toxicol* 38:351–365. doi: 10.1002/jat.3545.

Bichteler A, Wikoff DS, Loko F, **Harris MA**. 2017. Estimating serum concentrations of dioxin-like compounds in the U.S. population effective 2005–2006 and 2007–2008: A multiple imputation and trending approach incorporating NHANES pooled sample data. *Environ Int* 105:112–125. doi: 10.1016/j.envint.2017.05.003.

- Thompson CM, Wolf JC, McCoy A, Suh M, Proctor DM, Kirman CR, Haws LC, **Harris MA**. 2017. Comparison of toxicity and recovery in the duodenum of B6C3F1 mice following treatment with intestinal carcinogens captan, folpet, and hexavalent chromium. *Toxicol Pathol* 45(8):1091–1101. DOI: 10.1177/019262331yy4324.
- Thompson CM, Suh M, Proctor DM, Haws LC, **Harris MA**. 2017. Ten factors for considering the mode of action of Cr(VI)-induced gastrointestinal tumors in rodents. *Mut Res/Genetic Toxicol Environ Mutagen* 823:45–57.
- Thompson CM, Young RR, Dinesdurge H, Suh M, **Harris MA**, Rohr AC, Proctor DM. 2017. Assessment of the mutagenic potential of hexavalent chromium in the duodenum of big blue® rats. *Toxicol Appl Pharmacol* 330(1):48–52.
- Rager JE, Ring CL, Fry RC, Suh M, Proctor DM, Haws LC, **Harris MA**, Thompson CM. 2017. High-throughput screening data interpretation in the context of *in vivo* transcriptomic responses to oral Cr(VI) exposure. *Toxicol Sci* kfx085. doi: 10.1093/toxsci/kfx085.
- Thompson CM, Wolf JC, Elbekai RH, Paranjpe MG, Seiter JM, Chappell MA, Tappero RV, Suh M, Proctor DM, Bichteler A, Haws LC, **Harris MA**. 2015. Duodenal crypt health following exposure to Cr(VI): micronucleus scoring, γ-H2AX immunostaining, and synchrotron x-ray fluorescence microscopy. *Mut Res* 789–790:61–66.
- Thompson CM, Young RR, Suh M, Dinesdurge HR, Elbekai RH, **Harris MA**, Rohr, AC, Proctor DM. 2015. Assessment of the mutagenic potential of cr(VI) in the oral mucosa of big blue® transgenic f344 rats. *Environ Mol Mutagen*. 56(7):621–628. doi: 10.1002/em.21952.
- Thompson, CM, Seiter J, Chappell MA, Tappero RV, Proctor DM, Suh M, Wolf JC, Haws LC, Vitale R, Mittal L, Kirman CR, Hays SM, **Harris MA**. 2015. Synchrotron-based imaging of chromium and γ-H2AX immunostaining in the duodenum following repeated exposure to Cr(VI) in drinking water. *Toxicol Sci* 143(1):16–25.
- Suh M, Thompson C, Kirman C, Carakostas M, Haws LC, **Harris M**, Proctor D, Abraham L, Hixon JG. 2014. High concentrations of hexavalent chromium in drinking water alter iron homeostasis in F344 rats and B6C3F1 mice. *Food Chem Toxicol* 65:381–388.
- Urban JD, Wikoff DS, Bunch ATG, **Harris MA**, Haws LC. 2014. A review of background dioxin concentrations in urban/suburban and rural soils across the United States: Implications for site assessments and the establishment of soil cleanup levels. *Sci Tot Environ* 466–467: 586–597.
- Bunch AG, Perry CS, Abraham L, Wikoff DS, Tachovsky JA, Hixon JG, Urban JD, **Harris MA**, Haws LC. 2013. Evaluation of impact of shale gas operations in the Barnett Shale region on volatile organic compounds in air and potential human health risks. *Sci Tot Environ* 468–469(2014): 832–842.
- Kirman CR, Aylward LL, Suh M, **Harris MA**, Thompson CM, Haws LC, Proctor DM, Lin SS, Parker W, Hays SM. 2013. Physiologically based pharmacokinetic model for humans orally exposed to chromium. *Chem Biol Interact* 204:13–27. doi:pil: S0009-2797(13)00082-3. 10.1016/j.cbi.2013.04.003
- O'Brien T, Ding H, Suh M, Thompson C, Parsons BL, **Harris MA**, Winkelman WA, Wolf JC, Hixon JG, Schwartz AM, Myers MB, Haws LC, Proctor DM. 2013. Assessment of K-Ras mutant frequency and micronucleus incidence in the mouse duodenum following 90-days of exposure to Cr(VI) in drinking water. *Mutat Res* 754:15–21. pii: S1383-5718(13)00075-2. doi: 10.1016/j.mrgentox.2013.03.008
- Thompson CM, Proctor DM, Suh M, Haws LC, Kirman CR, **Harris MA**. 2013. Assessment of the mode of action underlying development of rodent small intestinal tumors following oral exposure to hexavalent chromium and relevance to humans. *Crit Rev Toxicol* 43(3):244–274.
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## ABSTRACTS AND PRESENTATIONS

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Copeland T, **Harris M**, Finley B, Paustenbach D. 1991. Health effects and environmental characterization of Octachlorodibenzo-p-dioxin (OCDD): Impact on risk assessment of former wood treatment sites. Society of Toxicology 30<sup>th</sup> Annual Meeting. February 25–March 1, 1991. Dallas, TX.



**Harris M**, Wenning R, Finley B, Paustenbach D. 1990. Evaluation of potential sources of 1,2,8,9-TCDD in aquatic biota from Newark Bay. Society of Environmental Chemistry and Toxicology. November 11–15, 1990. Washington, DC.

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Zacharewski T, **Harris M**, Safe S. 1989. Structure dependent induction of aryl hydrocarbon hydroxylase of TCDD and related compounds: mechanistic studies. Society of Toxicology 28<sup>th</sup> Annual Meeting. February 27–March 3, 1989. Atlanta, GA.

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# Laurie Couture Haws, Ph.D., DABT, ATS

MANAGING PRINCIPAL SCIENTIST

## CONTACT INFORMATION

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## PROFESSIONAL PROFILE

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Dr. Laurie Haws is a cofounder and Managing Principal Scientist with ToxStrategies and is based in Austin, Texas. She is a board-certified toxicologist and a Fellow of the Academy of Toxicological Sciences (ATS), and she has more than 30 years of experience in the areas of toxicology, human health risk assessment, risk communication, and scientific and regulatory policy.

Dr. Haws has substantial experience evaluating potential human health risks associated with exposures to a wide variety of chemicals and metals present as additives, ingredients, or contaminants in foods, consumer products, personal care products, pharmaceuticals, medical devices, and environmental media (air, water, soil, and sediments). She also has extensive experience assessing potential human health risks associated with personal, occupational, and community-wide exposures to air contaminants, particularly related to chemical, petrochemical, and shale gas exploration and production activities. Dr. Haws is a recognized expert at evaluating data concerning modes and mechanisms of action and in using this type of data to assess the relevance of findings to humans. She routinely applies these skills in the development of state-of-the-science toxicity values via the application of both default and more rigorous approaches, such as benchmark dose modeling, application of weight-of-evidence techniques, and consideration of mode-of-action information. In addition, Dr. Haws also has experience designing, placing, and overseeing a broad range of toxicology laboratory studies, including ADME (absorption, distribution, metabolism, and excretion), developmental toxicity, and cross-fostering studies. She also has experience designing, conducting, and interpreting data from biomonitoring studies, and is adept at using such data to assess concerns regarding potential exposures.

While Dr. Haws is an internationally recognized authority on the toxicity of and exposures to dioxin-like compounds, she has conducted assessments involving many other toxicants throughout her career, including chlorinated hydrocarbons, aromatic hydrocarbons, volatile organic compounds, PFAS, pesticides, phthalates, glycol ethers, metals, persistent organic pollutants, and others. She is knowledgeable about numerous state and federal regulatory programs and has assisted in the preparation of reports for submission to regulatory agencies such as the FDA, EPA, and California's Proposition 65 program. Dr. Haws also has substantial experience working with federal, state, and local government agencies, industry, trade associations, legislative representatives, the media, and members of the general public on matters related to the toxicity of chemicals encountered in our daily lives.

Dr. Haws has a diverse background, having worked as a researcher, a regulatory toxicologist with a government agency, and a scientific consultant. In fact, a substantial portion of her career has been spent in the government sector, both as a researcher and most recently as a manager in the Toxicology and Risk Assessment Section at the Texas Commission on Environmental Quality (TCEQ). In her position with the TCEQ, Dr. Haws was responsible for overseeing all human health risk assessment activities and was one of the primary authors of the agency's comprehensive risk-based corrective action rule (the Texas Risk Reduction Program [TRRP] rule).

Dr. Haws is an author on 60 peer-reviewed publications and has presented at many scientific conferences throughout her career. She is an active member of numerous professional societies, including the Society of Toxicology, Society for Risk Analysis, Toxicology Forum, American College of Toxicology, and the Regulatory Affairs Professional Society. Dr. Haws has served on numerous elected and appointed committees within the Society of Toxicology, including serving on Council, as well as serving as president of the Risk Assessment Specialty Section and the Women in Toxicology Special Interest Group.

Dr. Haws has participated in a number of scientific panels, technical workgroups, and advisory committees, including the World Health Organization's Toxic Equivalency Factor Review Panel. She was a panelist for a workshop convened in 2021 by the Alliance for Risk Assessment, discussing practical, problem-driven approaches to "fit-for-purpose" risk assessments. She also chaired the International Symposium on Halogenated and Persistent Organic Pollutants, held in San Antonio, Texas, in September 2010, and served on the Exposure and Human Health Committee of the USEPA's Science Advisory Board.

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## EDUCATION AND DEGREES EARNED

1990	Ph.D., Toxicology, School of Medicine, Curriculum in Toxicology, University of North Carolina (Chapel Hill)
1987	M.S., Environmental Sciences & Engineering (Toxicology), School of Public Health, University of North Carolina (Chapel Hill)
1985	B.S., Environmental Biology ( <i>magna cum laude</i> ), Long Island University (Southampton, NY)

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## CERTIFICATIONS

1994—present Diplomat, American Board of Toxicology

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## PROFESSIONAL HONORS/AWARDS

2021	Fellow of the Academy of Toxicological Sciences
1989, 1990	Society of Toxicology—Student Travel Award
1988	Level III Scientific & Technological Achievement Award (National Institute of Environmental Health Sciences)
1987, 1990	North Carolina Chapter of the Society of Toxicology—Student Travel Award
1983–1985	Presidential Scholarship
1983	Faculty Honors Award

1983 Outstanding Campus Leadership Award  
1984–1985 Beta Beta Beta; Biological Honor Society

## PROFESSIONAL ASSOCIATIONS

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### Society of Toxicology

- Council, Vice President-Elect (2022–2023), Vice President (2023–2024), President (2024–2025), and Past President (2025–2026)
- Audit Committee (2021–2024)
- Council, Secretary-Elect (2017–2018), Secretary (2018–2020)
- Risk Assessment Specialty Section, Councilor (2008–2010), Vice President-Elect (2011–2012), Vice President (2012–2013), President (2013–2014), Past President (2014–2015)
- Women in Toxicology, Councilor (2013–2015), Vice President (2015–2016), President-Elect (2016–2017), President (2017–2018), Past President (2018–2019)
- Scientific Liaison Coalition (2015–present)
- Special Interest Group Collaboration and Communication Group (2016–2017)
- Contemporary Concepts in Toxicology Committee Chair (2013–2014), Co-chair (2012–2013), member (2011–2014)
- Nominating Committee member (2008–2010)
- Continuing Education Committee, Chair (2006–2007), member (2004–2007)

### Toxicology Forum

- Past President (2023–2024)
- President (2022–2023)
- Vice President (2020–2022)
- Secretary (2018–2020)
- Board of Directors, Member (2016–2018)
- Program Planning Committee, member (2015), co-chair (2016), chair (2017)

### American College of Toxicology

### Product Stewardship Society

### Regulatory Affairs Professionals Society

### Society of Risk Analysis

## SCIENTIFIC ADVISORY PANELS, COMMITTEES, & WORKGROUPS

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2021 Panelist for an Alliance for Risk Assessment (ARA) virtual workshop titled, *Beyond Science & Decisions: From Problem Formulation to Dose-Response Assessment*

2010 Chair, International Symposium on Halogenated Persistent Organic Pollutants, San Antonio, Texas

2009–2017	U.S. Environmental Protection Agency Scientific Advisory Board Exposure and Human Health Committee
2007–2017	International Advisory Board Member, International Symposium on Halogenated Persistent Organic Pollutants
2005	Resource Expert, World Health Organization, Dioxins Toxic Equivalency Factor Review, Geneva, Switzerland, June 27–30
2001–2003	STAPPA/ALAPCO Residual Risk Steering Committee
2001	USEPA-State-Tribal Risk Assessment Workshop Planning Committee
1999–2003	Texas Risk Reduction Program Rule Target Chemicals of Concern (COC) Workgroup
1999–2003	Texas Risk Reduction Program Rule Chemicals of Concern (COC) Screening Workgroup
1999–2003	Texas Risk Reduction Program Rule Representative Concentrations Workgroup
1999–2003	Texas Risk Reduction Program Rule Exposure Factors Workgroup
1999–2001	Texas Risk Reduction Program Rule Probabilistic Risk Assessment Workgroup
1996–2003	Texas Commission on Environmental Quality Combustion Strategy Implementation Team
1995–1998	EPA Workgroup on Maximum Achievable Control Technology (MACT) Standards for Hazardous Waste Combustors
1995–2003	Federal/State Toxicology and Risk Analysis Committee
1994–1997	Texas Medical Association Committee on the Environment
1994–1999	Scientific Advisory Committee on Birth Defects in Texas

## PUBLICATIONS

Heintz MM, Chappell GA, Thompson CM, **Haws LC**. 2022. Evaluation of transcriptomic responses in livers of mice exposed to the short-chain PFAS compound HFPO-DA. *Front Toxicol* 4:937168, <https://doi.org/10.3389/ftox.2022.937168>.

Thompson CM, Bhat VS, Brorby GP, **Haws LC**. 2021. Development of updated RfD and RfC values for medium carbon range aromatic and aliphatic total petroleum hydrocarbon fractions. *J Air Waste Manag Assoc* 71(12):1555–1567, doi: 10.1080/10962247.2021.1974123.

Chappell GA, Heintz MM, **Haws LC**. 2021. Transcriptomic analyses of livers from mice exposed to 1,4-dioxane for up to 90 days to assess potential mode(s) of action underlying liver tumor development. *Curr Res Toxicol* 2:30–41; <https://doi.org/10.1016/j.crttox.2021.01.003>.

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Chappell GA, Thompson CM, Wolf JC, Cullen JM, Klaunig JE, **Haws LC**. 2020. Assessment of the mode of action underlying the effects of GenX in mouse liver and implications for assessing human health risks. *Toxicol Pathol* 48(3):494–508, doi: 10.1177/0192623320905803. PMID: 32138627.

Wikoff D, **Haws L**, Ring C, Budinsky R. 2019. Application of qualitative and quantitative uncertainty assessment tools in developing ranges of plausible toxicity values for 2,3,7,8-tetrachlorodibenzo-p-dioxin. *J Appl Toxicol*, doi: 10.1002/jat.3814. Open access, <https://onlinelibrary.wiley.com/doi/full/10.1002/jat.3814>.

Thompson CM, Fitch SE, Ring C, Rish W, Cullen JM, **Haws LC**. 2019. Development of an oral reference dose for the perfluorinated compound GenX. *J Appl Toxicol*, open access: <https://onlinelibrary.wiley.com/doi/full/10.1002/jat.3812>.

Urban J, Wikoff D, **Haws L**, Fitch S, Ring C, Thompson C, Suh M. 2018. Systematic review protocol: Systematic review and meta-regression to characterize the dose-response relationship between exposure to dioxin-like compounds during sensitive windows of development and reduced sperm count. Zenodo. <http://doi.org/10.5281/zenodo.1636357>.

Wikoff DS, Rager JE, Chappell GA, Fitch S, **Haws L**, Borghoff SJ. 2018. A framework for systematic evaluation and quantitative integration of mechanistic data in assessments of potential human carcinogens. *Toxicol Sci* 167(2):322–335, <https://doi.org/10.1093/toxsci/kfy279>.

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Wikoff D, Urban JD, Harvey S, **Haws LC**. 2018. Role of risk of bias in systematic review for chemical risk assessment: A case study in understanding the relationship between congenital heart defects and exposures to trichloroethylene. *Int J Toxicol*, DOI: 0.1177/1091581818754330.

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Thompson CM, Suh M, Proctor DM, **Haws LC**, Harris MA. 2017. Ten factors for considering the mode of action of Cr(VI)-induced gastrointestinal tumors in rodents. *Mut Res/Genetic Toxicol Environ Mutagen* 823:45–57.

Rager JE, Ring CL, Fry RC, Suh M, Proctor DM, **Haws LC**, Harris MA, Thompson CM. 2017. High-throughput screening data interpretation in the context of *in vivo* transcriptomic responses to oral Cr(VI) exposure. *Toxicol Sci* kfx085. doi: 10.1093/toxsci/kfx085.

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## BOOK CHAPTER

Staskal DF, Birnbaum LS, **Haws LC**. 2011. Application of a relative potency factor approach in the assessment of health risks associated with exposures to mixtures of dioxin-like compounds. In: Mumtaz M (Ed), *The Principles and Practice of Mixtures Toxicology*. Wiley, ISBN 978-3-527-63211-4.

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## ABSTRACTS AND PRESENTATIONS

Heintz MM, LaPlaca SB, **Haws LC**. Application of an integrated ecotoxicological study reliability tool in the derivation of predicted no-effect concentrations for short chain and ultrashort chain per- and polyfluoroalkyl substances. Poster at Society of Environmental Toxicology and Chemistry (SETAC), Philadelphia, PA, November 2022.

LaPlaca SB, Heintz MM, Wikoff D, **Haws LC**. Multi-step integration of ecotoxicological study reliability in ecological risk assessment. Poster at Society of Environmental Toxicology and Chemistry (SETAC), Philadelphia, PA, November 2022.

Heintz MM, Chappell GA, Thompson CM, Wolf JC, Rogers JM, **Haws LC**. HFPO-DA (GenX) transcriptomic responses in pregnant and non-pregnant rat livers: Analyses to inform the role of maternal effects on neonatal toxicity. Poster presented at Society of Toxicology Annual Meeting, San Diego, CA, March 2022.

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Ring C, Fitch S, **Haws L**, Harris M, Wikoff D. Quantitative integration of dose-response data for relative potency estimates of dioxin-like chemicals. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, <https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P3385>.

Thompson CM, Ring C, Pham L, Chappell GA, **Haws LC**. Assessment of the relevance of toxicological findings in the development of an oral reference dose for GenX. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, <https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P2764>.

**Haws L** (Session Co-Chair). Introduction — Use of New Approach Methods in Risk Characterization of PFAS: Challenges and Opportunities. 44<sup>th</sup> Annual Winter Meeting, the Toxicology Forum, Tysons, VA, January 27–29, 2020 (see: <https://dialogue.toxforum.org/d/do/894>).

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Urban J, Wikoff D, **Haws L**. Three-tiered approach to integrating evidence streams assessing gestational trichloroethylene exposure and congenital heart defects (TCE-CHD). Poster at Evidence Integration in Chemical Assessments: Challenges Faced in Developing and Communicating Human Health Effect Conclusions. National Academies of Sciences, Engineering, and Medicine. Washington, DC, June 2019.

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Ring CL, Urban J, Wikoff D, Thompson C, Budinsky RA, **Haws LC**. Application of systematic review and quantitative evidence integration methods to support risk assessment: Characterization of the dose-response relationship between exposure to dioxin-like compounds (DLC) and sperm count. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.

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**Haws LC**. Is there a need for short-term response actions for trichloroethylene? A toxicologist's view. Invited Speaker. Presented at the Air and Waste Management Association's Vapor Intrusion, Remediation, and Site Closure Conference – Balancing Technical Defensibility, Risk, Sustainability, and Costs. December 7–8, 2016. San Diego, CA.

**Haws LC**. Vapor intrusion – Solid ground or quick sand? Invited Speaker. Presented at the 28th Annual Texas Environmental Superconference. August 5, 2016. Austin, TX.

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**Haws LC**. Trichloroethylene exposure and development of fetal cardiac malformations: What do the data tell us about inhalation exposures resulting from vapor intrusion and potential health risks to pregnant women? – Introduction. Presented at the Society of Toxicology's 55th Annual Meeting, March 13–17, 2016. New Orleans, LA.

D Wikoff, SJ Borghoff, JE Rager and **LC Haws**. Human relevance assessment of tetrabromobisphenol-A (TBBPA) induced uterine adenocarcinomas: Mode of action dependent on high dose molecular initiating event (MIE). Presented in the "Flame Retardants" Session of the Society of Toxicology's 55th Annual Meeting, March 13–17, 2016. New Orleans, LA.

SJ Borghoff, D Wikoff, JE Rager, and **LC Haws**. Tetrabromobisphenol A (TBBPA): Dose- and time-dependent changes in plasma TBBPA and its conjugates over 28 days of administration. Presented at the Society of Toxicology's 55th Annual Meeting, March 13–17, 2016. New Orleans, LA.

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Wikoff DS, Thompson C, Walker N, DeVito M, Harris M, Birnbaum L, **Haws L**. Derivation of relative potency estimates using benchmark dose modeling: a case study with TCDF. Presented at Dioxin 2011. Brussels, Belgium, August 21-25, 2011.

**Haws L**, Tachovsky A, Aylward L, Urban J, Fitzgerald L, Harris M, Wikoff D. Using toxicokinetics to improve soil exposure and risk assessments. Presented at the 37th Annual Summer Meeting of The Toxicology Forum. Aspen, CO, July 10-14, 2011.

Harris M, Proctor D, **Haws L**, Suh M, Thompson C. Hexavalent Chromium Mode of Action Research Program: Current findings. Presented at the USEPA Science Advisory Panel Meeting on the Draft EPA Toxicological Review of Hexavalent Chromium. Washington, D.C., May 12, 2011.

**Haws L**, Thompson C, Proctor D, Suh M, Harris M. Hexavalent Chromium Mode of Action Research Program: Overview. Presented at the USEPA Science Advisory Panel Meeting on the Draft EPA Toxicological Review of Hexavalent Chromium. Washington, D.C., May 12, 2011.

Proctor D, Thompson C, Suh M, **Haws L**, Harris M. Hexavalent Chromium Mode of Action Research Project to advance risk assessment. Presented at the USEPA Science Advisory Panel Meeting on the Draft EPA Toxicological Review of Hexavalent Chromium, May 12, 2011. Washington, D.C.

Fitzgerald L, Burkhalter B, Urban J, Staskal D, Harris M, **Haws L**. VOC serum levels in the general U.S. population: An analysis of the 2003-2004 NHANES dataset. Presented at the Society of Toxicology's 50th Annual Meeting. Washington, D.C., March 6-10, 2011.

**Haws L**, Proctor D, Thompson C, Harris M. Research plan to fill data gaps in the mode of action for cancer risk assessment of hexavalent chromium in drinking water. Presented at the Society of Toxicology's 50th Annual Meeting. Washington, D.C., March 6-10, 2011.

Proctor D, Thompson C, **Haws L**, Harris M. Use of mode of action and pharmacokinetic findings to inform the cancer risk assessment of ingested Cr(VI): A Case Study. Presented at the Society of Toxicology's 50th Annual Meeting. Washington, D.C., March 6-10, 2011.

Thompson C, Perry C, Gaylor D, Tachovsky A, Burkhalter B, **Haws L**. Derivation of an oral reference dose and drinking water screening level for sulfolane using benchmark dose modeling. Presented at the Society of Toxicology's 50th Annual Meeting. Washington, D.C., March 6-10, 2011.

Urban J, Fitzgerald L, Burkhalter B, Staskal D, Harris M, **Haws L**. BTEX serum levels in the general U.S. population: An analysis of 2003-2004 NHANES dataset. Presented at the Society of Toxicology's 50th Annual Meeting. Washington, D.C., March 6-10, 2011.

**Haws L**, Harris M, Urban J, Wikoff D. Hexavalent Chromium Mode of Action Research Project to advance risk assessment. Presented at USEPA Science Advisory Board Dioxin Review Panel Meeting. Washington, D.C., October 27, 2010.

Harris M, Wikoff D, Urban J, **Haws L**. EPA's draft dioxin reanalysis: Comments to the EPA Science Advisory Board Dioxin Panel. Presented at USEPA Science Advisory Board Dioxin Review Panel Meeting. Washington, D.C., October 27, 2010.

Harris M, Tachovsky JA, Staskal-Wikoff D, Aylward L, Burkhalter B, Simon T, **Haws L**. Serum concentrations of dioxin-like compounds in a population in midland michigan: An evaluation of the impact of soil exposures. Presented at Dioxin 2010. San Antonio, TX, September 12-17, 2010.

Harris M, Tachovsky JA, Staskal-Wikoff D, Simon T, Burkhalter B, Urban J, **Haws L**. Assessment of the impact of various soil cleanup levels on serum concentrations of dioxin-like compounds in humans. Presented at the 49th Annual Meeting of Society of Toxicology. Salt Lake City, Utah, March 7-11, 2010.

**Haws L**. Biomonitoring — A tool for assessing community exposures to air toxics. Presented at the Air Quality 2010 conference, hosted by the University of Texas School of Law. Austin, TX, November 19, 2010.

**Haws L**, Tachovsky JA, Staskal-Wikoff D, Aylward L, Burkhalter B, Urban J, Simon T, Harris M. An evaluation of the influence of different soil cleanup levels on the concentration of dioxin-like compounds in human serum. Presented at Dioxin 2010. San Antonio, TX, September 12-17, 2010.

**Haws L**. Biomonitoring: The circle of life. Presented in the Oil and Gas special session, at the 22nd Annual Texas Environmental Superconference. Austin, TX, August 5-6, 2010.

Tachovsky JA, **Haws L**. Application of principal components analysis and sequential gaussian simulation to a comprehensive soil sampling dataset to predict PCDD/F concentrations in Midland, MI. Presented at Dioxin 2010. San Antonio, TX, September 12-17, 2010.

Tachovsky A, Staskal D, Urban J, Harris MA, **Haws L**. Assessment of environmental data collected in a community with numerous petroleum refining and petrochemical facilities. Presented at the 49th Annual Meeting of Society of Toxicology. Salt Lake City, Utah, March 7-11, 2010.

Tachovsky JA, **Haws L**. Geostatistical estimation of soil PCDD/F TEQ using sequential Gaussian simulation and the aggregation of results in Midland, MI. Presented at the Society for Risk Analysis annual meeting. Salt Lake City, UT, December 5-8, 2010.

Urban J, Burkhalter B, Tachovsky JA, **Haws L**, Harris M. Evaluation of polychlorinated naphthalenes (PCNs) in Newark Bay sediment. Presented at Dioxin 2010. San Antonio, TX, September 12-17, 2010.

**Haws LC**, DeVito MJ, Walker NJ, Birnbaum LS, Farland WH, Harris MA, Tachovsky JA, Unice KM, Scott PK, Staskal-Wikoff DF. Development of distributions of relative potency estimates to quantitatively assess uncertainty inherent in the TEFs for dioxin-like compounds: A proposed consensus-based weighting. Presented at Dioxin 2009. Beijing, China, 2009.

Staskal-Wikoff DF, Harris MA, **Haws LC**, Birnbaum LS, Tachovsky JA. Probabilistic evaluation of cancer and non-cancer risk associated with exposure to BDE 209 in automobiles. Presented at Dioxin 2009. Beijing, China, 2009.

Urban JD, Tachovsky JA, Staskal DF, **Haws LC**, Harris MA. Human health risk assessment of consumption of fish from the Lower Passaic River. Presented at the 48th Annual Meeting of the Society for Toxicology. Baltimore, MD, March 15-19, 2009.

**Haws LC**, DeVito MJ, Walker NJ, Birnbaum LS, Unice KM, Scott PK, Harris MA, Tachovsky A, Farland WH, Finley BF, Staskal DF. 2008. Development of weighted distributions of REPs for dioxin-like compounds: Implications for risk assessment. Presented at the Society of Toxicology Annual Meeting. Seattle, WA, March 16-20, 2008.

Harris MA, Tachovsky JA, Williams ES, Paustenbach DP, **Haws LC**. 2008. Assessment of the Health Risks Posed by Benzene in Soft Drinks. Society of Toxicology Annual Meeting. Seattle, WA, March 16-20, 2008.

Scott LLF, Staskal DF, Harris MA, Finley BL, **Haws LC**. 2008. Evaluation of dioxin-like compounds in workers from a primary magnesium production facility relative to levels observed in the general US population. Presented at the Society of Toxicology Annual Meeting. Seattle, WA, March 16-20, 2008.

Staskal DF, Donovan EP, **Haws LC**, Roberts JD, Unice KM, Finley BL, Harris MA. 2008. Human Health risks associated with exposure to pathogens in waters and sediments of the Lower Passaic River. Presented at the Society of Toxicology Annual Meeting. Seattle, WA, March 16-20, 2008.

Urban JD, **Haws LC**, Scott LF, Scott PS, Staskal DF, Tachovsky AT, Unice KM, Harris MA. 2008. A framework for evaluating serum dioxin data derived from biomonitoring studies. Presented at the Society of Toxicology Annual Meeting. Seattle, WA, March 16-20, 2008.

DeSesso J, Watson RE, Keen CL, Hazleden KP, **Haws LC**, Li AA. 2007. Integration of developmental toxicity data into risk assessment: A case study of dimethoate. Society of Toxicology. Charlotte, NC, March 25-29, 2007.

Ferriby LL, Harris MA, Unice KM, Scott PK, **Haws LC**, Paustenbach DJ. 2007. Development of PCDD/F and dioxin-like PCB serum concentration reference values for the general U.S. population using the 2006 WHO TEFs and the 2001-2002 NHANES data. Society of Toxicology. Charlotte, NC, March 25-29, 2007.

Harris M, Tachovsky JA, Williams ES, Scott LLF, Nguyen L, **Haws LC**. 2007. Risks posed by air pollutants in the Houston metropolitan area. Society for Risk Analysis Annual Meeting. San Antonio, TX, December 9-12, 2007.

Harris M, Scott LLF, Nguyen LM, **Haws LC**. Trends in elevated blood lead levels of U.S. children and associated demographic characteristics. *Ann Epidemiol* 17: 748.

Harris M, **Haws LC**, Tachovsky A, Williams ES, Nguyen LM, Scott LF. Interactive processes in toxicity assessments. Air toxics research: Implications of research on policies to protect public health. Houston, TX, June 12-13, 2007.



**Haws LC**, Scott LLF, Staskal DF, Harris M, Finley B. Evaluation of biomonitoring data for dioxin-like compounds in workers at a primary magnesium production facility. Society for Risk Analysis Annual Meeting. San Antonio, TX, December 9–12, 2007.

**Haws LC**, Scott LLF, Staskal DF, Harris MA, Finley BL. 2007. Dioxin-like compounds in workers at a primary magnesium production facility. Dioxin 2007. Tokyo, Japan, September 2-7, 2007.

**Haws LC**, Walker NJ, DeVito MJ, Birnbaum LS, Unice KM, Scott PK, Harris MA, Farland WH, Finley BL, Staskal DF. Development of weighted distributions of REPs for dioxin-like compounds (DLCs). Society of Toxicology Annual Meeting. Charlotte, NC, March 25–29, 2007.

Nguyen LM, Scott LLF, Harris M, **Haws LC**. 2007. Factors contributing to blood lead levels in U.S. children based on NHANES data. *Ann Epidemiol* 17:734–735.

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Scott P, **Haws L**, Scott L, Harris M. Evaluation of background 2,3,7,8-PCDD/F congener profiles in human serum collected during NHANES 2001–2002 using principal components analysis. Dioxin 2007. Tokyo, Japan, September 2-7, 2007.

Scott P, **Haws L**, Scott L, Harris M. Evaluation of background dioxin-like PCB congener profiles in human serum collected during NHANES 2001–2002 using principal components analysis. Dioxin 2007. Tokyo, Japan, September 2-7, 2007.

Scott L, Nguyen L, Harris M, Craft E, **Haws L**. 2007. Comparison of all cancer rates among urban areas and counties within Texas. *Am J Epidemiol* 165(11):S6–S6.

Staskal DF, Donovan EP, **Haws LC**, Roberts JD, K.M. Unice, B.L. Finley, and M.A. Harris. A quantitative microbial risk assessment for exposure to pathogens in waters and sediments of the Lower Passaic River. Society for Risk Analysis annual meeting, December 9-12, 2007. San Antonio, TX.

Staskal DF, Scott LLF, Williams ES, Luksemburg WJ, **Haws LC**, Birnbaum LS, Nguyen LM, Paustenbach DJ, Harris MA. Daily intake estimates of PBDEs associated with consumption of catfish in the U.S. Presented at the Fourth International Workshop on Brominated Flame Retardants. Amsterdam, the Netherlands, April 24-27, 2007.

Tachovsky JA, **Haws LC**, Scott LF, Williams ES, Harris M. Benzene in soft drinks and other beverages: Do measured levels pose a human health risk? Society for Risk Analysis' Annual Meeting. San Antonio, TX, December 9-12, 2007.

Williams ES, Ferriby LL, **Haws LC**, Paustenbach DJ, Harris MA. Assessment of potential human health risks posed by benzene in a commercial beverage. Society of Toxicology. Charlotte, NC, March 25-29, 2007.

Ferriby LL, Williams ES, Luksemburg WJ, Paustenbach DJ, **Haws LC**, Birnbaum LS, Harris MA. Comparing polychlorinated biphenyls in farm-raised and wild-caught catfish from southern Mississippi. Dioxin 2006. Oslo, Norway, August 21-25.

Ferriby LL, Williams ES, Luksemburg WJ, Paustenbach DJ, **Haws LC**, Birnbaum LS, Harris MA. 2006. Comparing PCDDs, PCDFs, and dioxin-like PCBs in farm-raised and wild-caught catfish from southern Mississippi. Dioxin 2006. Oslo, Norway, August 21-25, 2006.

Ferriby LL, Franke K, Unice KM, Scott P, **Haws LC**, Harris M, Paustenbach DJ. Serum reference levels of PCDD/Fs and dioxin-like PCBs stratified by race/ethnicity, gender and age for the general U.S. population. American Public Health Association Annual Meeting and Exposition. Boston, MA, November 4-8, 2006.

**Haws L**. The use of toxic equivalency factors to assess potential human health risks posed by dioxin-like compounds: Keeping up with the science. Presented at Michigan State University, Toxicology Program Seminar Series. East Lansing, MI, September 26, 2006.

**Haws LC**, Scott PK, Unice KM, Gough M, Harris M, Staskal DF, Paustenbach DJ, Pavuk M. Are dioxin body burdens surrogates for other risk factors in associations between dioxin and diabetes? Dioxin 2006. Oslo, Norway, August 21-25, 2006.

**Haws LC**, DeVito MJ, Birnbaum LS, Walker NJ, Scott PK, Unice KM, Harris MA, Farland WH, Finley BL, Staskal DF. An alternative method for establishing TEFs for dioxin-like compounds. Part 2. Development of an approach to quantitatively weight the underlying potency data. Dioxin 2006. Oslo, Norway, August 21-25.

Paustenbach DJ, Harris M, Ferriby LL, Williams ES, **Haws LC**, Unice KM, Scott PK. 2006. Development of PCDD/F TEQ serum reference values for the U.S. population for use in evaluating biomonitoring results. Dioxin 2006. Oslo, Norway, August 21-25, 2006.

Scott PK, **Haws LC**, Staskal DF, Birnbaum LS, Walker NJ, DeVito MJ, Harris MA, Farland WH, Finley BL, Unice KM. An alternative method for establishing TEFs for Dioxin-like compounds. Part 1. Evaluation of decision analysis methods for use in weighting relative potency data. Dioxin 2006, August 21-25. Oslo, Norway.

Staskal DF, Unice KM, Walker NJ, DeVito MJ, Birnbaum LS, Scott PK, Harris MA, Farland WH, Finley BL, and **Haws LC**. An alternative method for establishing TEFs for dioxin-like compounds. Part 3. Development of weighted distributions of REPs for PCB126 and 2,3,4,7,8-PeCDF. Dioxin 2006. Oslo, Norway, August 21-25.

Staskal DF, Ferriby LL, Williams ES, Luksemburg WJ, **Haws LC**, Birnbaum LS, Paustenbach DJ, Harris M. 2006. Polybrominated diphenyl ethers in southern Mississippi catfish. Dioxin 2006. Oslo, Norway, August 21-25.

**Haws L**. Evaluating Potential Health Risks Posed By PCDDs, PCDFs, and Dioxin-like PCBs: An approach for improving the toxicity equivalency factor (TEF) methodology. 30<sup>th</sup> Annual Winter Meeting of the Toxicology Forum. Washington, DC, February 2, 2005.

**Haws L**. Roundtable: Is it time to reevaluate the toxic equivalency factors for PCDDs, PCDFs, and dioxin-like PCBs? The use of toxicity equivalence factors (TEFs) for PCDDs, PCDFs, and dioxin-like PCBs in risk assessment: Improving the process. Dioxin 2004. Berlin, Germany, September 6-10, 2004.

**Haws L**, Harris M, Su S, Birnbaum L, DeVito M, Farland W, Walker N, Connor K, Santamaria A, Finley B. Development of a refined database of relative potency estimates to facilitate better characterization of variability and uncertainty in the current mammalian TEFs for PCDDs, PCDFs, and dioxin-like PCBs. Dioxin 2004. Berlin, Germany, September 6-10, 2004.

**Haws L**, Harris M, Su S, Walker N, Birnbaum L, DeVito M, Farland W, Connor K, Santamaria A, Finley B. A preliminary approach to characterizing variability and uncertainty in the mammalian PCDD/F and PCB TEFs. Dioxin 2004. Berlin, Germany, September 6-10, 2004.

**Haws L**. Combustion risk modeling and assessment. Presented at the Texas Commission on Environmental Quality Workshop on Hazardous Waste Combustion. Austin, TX, May 7, 2003.

**Haws L**. Permitting of hazardous waste combustion facilities in the state of Texas: Human health risks associated with fugitive emissions sources. Presented at the Texas Chemical Council Quarterly Meeting. Houston, TX, August 1, 2002.

**Haws L.** Texas Risk Reduction Program rule—The basics. Question and Answer Forum Panelist. Presented at the Texas Natural Resource Conservation Commission Environmental Trade Fair. Waste Remediation Track. Austin, TX, May 7, 2002.

**Haws L.** Toxicology and risk assessment resources and practices in the state of Texas. Presented at the USEPA Region 6 States Risk Assessment Roundtable. Dallas, TX, April 5, 2002.

**Haws L.** Risk Assessment Coordination Between EPA and States Panelist. Presented at the USEPA Regional Risk Assessors Annual Conference. Bandera, TX, May 25, 2001.

**Haws L.** Texas Risk Reduction Program Rule—Practical Applications. Question and Answer Forum Panelist. Presented at the Texas Natural Resource Conservation Commission Environmental Trade Fair. Waste Remediation Track. April 30, 2001. Austin, TX.

Tachovsky JA, McCoy JT, **Haws LC.** Development and implementation of probabilistic risk assessment protocol in Texas. Presented at the 94th Conference of the AWMA. June 24-28, 2001. Orlando, FL.

Grant, R.L., Morrill D, Manis D, Tachovsky A, **Haws LC.** 2000. The Texas combustion project: Review of trial burn/risk burn plans and reports. Proceedings, International Conference on Incineration and Thermal Treatment Technologies. Portland, OR, May 8–12, 2000.

Tachovsky JA, **Haws LC,** Hofelt CS, McCoy JT. 2000. Risk assessment implementation in Texas. Proceedings, International Conference on Incineration and Thermal Treatment Technologies. Portland, OR, May 8–12, 2000.

**Haws L.** Permitting of hazardous waste combustion facilities in the state of Texas: Risk assessment procedures and status update. Presented at the Texas Chemical Council Quarterly Meeting. Houston, TX, September 15, 1999.

Fraiser LH, Tachovsky JA, King ME, McCoy JT, **Haws LC.** Hazardous waste combustion risk assessment experience in the state of Texas. Proceedings, International Conference on Incineration and Thermal Treatment Technologies Conference. Salt Lake City, UT, May 11–15, 1998.

Fraiser LH, Lund LG, Tyndall KH, King ME, Schultz DA, **Haws LC.** Case Studies in risk assessment for hazardous waste burning cement kilns. Air and Waste Management Association Specialty Conference. Waste Combustion in Boilers and Industrial Furnaces. Kansas City, MO, March 25-26, 1996.

Lund LG, **Haws LC,** McCoy JT, Carlisle LC, Brymer D, Thompson D, Wiersema JM. Addressing community concerns about industrial emissions and burning of hazardous waste in cement kilns: a summary of environmental data. Air and Waste Management Association Specialty Conference. Waste Combustion in Boilers and Industrial Furnaces. Kansas City, MO, March 25–26, 1996.

McCoy JT, **Haws LC,** Carlisle LC, Wiersema JM, Carmichael D, Thompson D, Mgebroff S. 1996. Soil sampling and analysis for PCDDs/PCDFs Downwind of combustion sources in six Texas communities. Society of Environmental Toxicology and Chemistry Annual Meeting Abstract Book.

Fraiser LH, Lund LG, Hueske KL, **Haws LC.** 1995. Indirect risk assessment: case studies of hazardous waste combustors. Society of Toxicology Annual Meeting. Baltimore, MD, March 5-9, 1995.

**Haws L.** How are we implementing the combustion strategy and indirect risk assessment? Presented at the Texas Natural Resource Conservation Commission Hazardous Waste Seminar. Houston, TX, October 26–27, 1994.

**Haws L.** Indirect risk assessment. Presented at the Sixth Annual Texas Environmental Superconference. Austin, TX, August 4–5, 1994.

**Haws L.** Overview of TNRCC/EPA concerns, strategies, and schedules concerning indirect risk assessment requirements. Presented at the Workshop on Risk Assessment and Waste Incineration Facilities. Houston, TX, June 28-29 1994.

**Haws L.** Indirect risk workshop. Panel Discussant. Presented at the RCRA Policy Forum. Washington, DC, January 31, 1994.

**Haws L.** Keynote address. Presented at the DRE Environmental Services Workshop on EPA's New Policy of Hazardous Waste Combustion. Austin, TX, January 21, 1994.

**Haws L.** Principles of toxicology and risk assessment. Presented at the University of Texas at Austin. LBJ School of Public Affairs. Austin, TX, September 10, 1993.

**Haws L.** Developmental toxicity of TCDD and related compounds. Presented at the Texas A&M University Faculty of Toxicology Seminar Series. College Station, TX, October 12, 1992.

Jackson, BA, **Haws LC**, Wixtrom RJ, Starr TB. 1991. Secondary mechanisms in carcinogenesis: Breaking out of the no-threshold paradigm. American College of Toxicology Annual Meeting. Savannah, Georgia, 1991.

**Couture LA**, Harris MW, Clark AM, Birnbaum LS. Persistence of hydronephrosis in mice following in utero and/or lactational exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Presented at the Society of Toxicology Annual Meeting. Miami Beach, FL, February 12-16, 1990.

**Couture, LA**, Harris MW, Birnbaum LS. Characterization of TCDD-induced hydronephrosis relative to cleft palate in C57BL/6N Mice. Presented at the Society of Toxicology Annual Meeting. Atlanta, GA, February 27-March 3, 1989.

**Couture LA**, Harris MW, Birnbaum LS. Teratogenicity of 2,3,4,7,8-pentachlorodibenzofuran (4-PeCDF) in F344 rats. Presented at the Society of Toxicology Annual Meeting. Dallas, TX, February 15-19, 1988.

**Couture LA**, Birnbaum LC. Evaluation of subchronic exposure to octachlorodibenzodioxin (OCDD). Society of Toxicology Annual Meeting. Washington, DC, February 23-27, 1987.

Birnbaum LS, **Couture LA**. Disposition of octachlorodibenzo-p-dioxin (OCDD) in rats. Society of Toxicology Annual Meeting. New Orleans, LA, March 3-7, 1986.

# Daniele (Staskal) Wikoff, Ph.D.

PRINCIPAL

PRACTICE DIRECTOR, HEALTH SCIENCES



## CONTACT INFORMATION

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## PROFESSIONAL PROFILE

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Dr. Daniele Wikoff is the Director of ToxStrategies' Health Sciences Practice and is based in Asheville, North Carolina. She specializes in the use of evidence-based methods in support of hazard and risk assessment applications. Dr. Wikoff has led the firm's initiatives to integrate evidence-based methods as part of safety assessments for food ingredients and contaminants, industrial chemicals, cosmetic ingredients, OTCs, and consumer products. She has successfully implemented a turn-key process for conducting systematic assessments at ToxStrategies, with a workflow facilitated by the combination of an experienced multidisciplinary team and use of systematic review software and tools. She has experience applying these methods to a wide range of agents (e.g., caffeine, TCE, TCDD, low-calorie sweeteners, sunscreen actives), across evidence streams (human, experimental animal, mechanistic), to heterogeneous data sets (e.g., epidemiological data and high-throughput data), for a variety of outcomes (e.g., endocrine disruption, carcinogenicity). Dr. Wikoff is well versed in frameworks and guidance from authorities around the world, including NTP-OHAT, EPA-TSCA and EPA-IRIS, EFSA/ECHA, IOM, WHO, GRADE, Cochrane, and others—as well as tools and software—that are used to manage and facilitate the systematic review process.

Dr. Wikoff's experience as a practitioner of both risk assessment and systematic review allows for a unique area of expertise in the evolving field of evidence-based toxicology. Dr. Wikoff has diverse experience in applying systematic mapping (scoping reviews) and systematic reviews as platforms for facilitating risk assessment, including development of health-based benchmarks and pathway-based analyses. She also routinely uses computational approaches to identify and evaluate evidence, integrating data from databases such as ToxRefDB and ToxCast/Tox21. Dr. Wikoff regularly employs both qualitative (e.g., AOP-based integration) and quantitative integration techniques (e.g., meta-analyses, Bayesian/meta-regression) to characterize hazards, points of departure, estimates of relative potency, and dose-response relationships. Her expertise extends to the topic-specific application of various organizational concepts for mechanistic data, including key characteristics, adverse outcome pathways, and mode of action. Dr. Wikoff has particular interest in methods development related to the definition and evaluation of data quality, and how elements of internal, construct, and external validity can be used to transparently inform conclusions and provide critical information to decision makers.

Dr. Wikoff is involved in a number of global collaborations to advance the practice of evidence-based toxicology, highlighted by her membership on the Board of Trustees and role as the Chair of the Science Advisory Council for the Evidence-Based Toxicology Collaboration (EBTC), membership on a National Academy of Sciences committee in the capacity of systematic review, co-authorship on the World Health Organization's systematic review framework, and service as an Associate Editor for *Toxicological Sciences* in the area of systematic review. She has been an invited speaker and participant at systematic-review workshops hosted by the National Academics of Sciences, the European Food Safety Authority, and the U.S. Environmental Protection Agency. She also co-taught a Continuing Education course on systematic review for the Society of Toxicology, as well as in an advanced course on systematic review at EUROTOX in 2021. Dr. Wikoff has presented on systematic review topics in a variety of scientific forums, including the Toxicology Forum and the Society of Risk Assessment. She is on the International Editorial Board of the journal *Food and Chemical Toxicology*, and she serves on the Editorial Board of *Current Opinion in Toxicology*. She is also an Associate Editor for *Regulatory Toxicology and Pharmacology*. For the Society of Toxicology, Dr. Wikoff is an elected Councilor to the Food Safety Specialty Section and serves as the Vice-President of the Risk Assessment Specialty Section.

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## EDUCATION AND DEGREES EARNED

- 2005 Ph.D., Toxicology, University of North Carolina at Chapel Hill  
2000 B.S., Chemistry and Biology, Buena Vista University

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## PROFESSIONAL ACTIVITIES AND AWARDS

International Editorial Board, *Food and Chemical Toxicology*  
Scientific Program Committee, Society of Toxicology  
Associate Editor (Systematic Reviews), *Toxicological Sciences*  
Associate Editor, *Regulatory Toxicology and Pharmacology*  
Associate Editor, *Current Opinions in Toxicology*  
Councilor, Food Safety Specialty Section, Society of Toxicology  
Member/Author, World Health Organization Systematic Review Framework  
Board of Trustees Member, Evidence-Based Toxicology Collaboration, Johns Hopkins University  
Chair, Science Advisory Council, Evidence-Based Toxicology Collaboration, Johns Hopkins University  
Member, GRADE Environmental Health Project Group and Dose-Response Project Group  
Committee Member, National Academies of Science (NAS), Review of the IRIS Protocol for Inorganic Arsenic  
Lead author of article named Best Paper of the Year for 2018 by the Regulatory and Safety Evaluation Specialty Section of the Society of Toxicology  
Lead author of article named Best Paper of the Year for 2017 by Editors of *Food and Chemical Toxicology*  
U.S. Department of Agriculture — Scientific Quality Reviewer (ARS project plans)  
National Institute of Environmental Health Sciences — Virtual Consortium for Translational/Transdisciplinary Environmental Research (VICTER) Consortium (R01 grant reviews)

Health Canada Expert Reviewer — Review of Biomonitoring Equivalents: Derivation of Biomonitoring Equivalents for Pentabromodiphenylether (PBDE-99)

EPA External Review Panel — An Exposure Assessment of Polybrominated Diphenyl Ethers (External Review Draft)

Past President, Ethical, Legal, and Social Issues Specialty Section, Society of Toxicology

Past Secretary/Treasurer, Risk Assessment Specialty Section, Society of Toxicology

Co-Chair, International Symposium on Halogenated Persistent Organic Pollutants, DIOXIN 2010

## PROFESSIONAL ASSOCIATIONS

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Evidence Based Toxicology Collaboration

Society of Toxicology (SOT), North Carolina Regional Chapter

Society for Risk Analysis (SRA)

Toxicology Forum

## GUEST LECTURES, CONTINUING EDUCATION, AND INVITED SPEAKER

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Guest Lecture: University of North Carolina, Chapel Hill, Toxicology Curriculum, November 2021. “Using systematic review for risk assessment.”

Guest Lecture: Johns Hopkins Center for Clinical Trials and Evidence Synthesis, October 2021. “Survey of evidence-based toxicology applications: use of systematic mapping and systematic review to evaluate adverse effects and risk assessment.”

Continuing Education Speaker: EUROTOX 2021. Advances in conducting systematic reviews for chemical assessment: Automation, uncertainty assessment, and synthesis.

Invited Speaker: OECD EAGMST Initiative on Systematic Methods in AOP Development, March 2021. “Systematic methods in AOPs: Success is dependent on problem formulation.”

Continuing Education Speaker: Institute for the Advancement of Food and Nutrition Sciences (IAFNS), July 2021. “The [acceptable daily intake] for low- and no-calorie sweeteners: Origin, interpretation, and application.”

Continuing Education Speaker: Society of Toxicology, 2019. Conducting systematic review in toxicology – Why, when, how?

Invited Speaker, USEPA Advancing Systematic Review Workshop (2018)

Invited speaker: EPA Systematic Review Community of Practice (SR CoP)—“Evidence integration,” July 2018

## SYSTEMATIC REVIEW PUBLICATIONS

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Borghoff SJ, Cohen SS, Jiang X, Lea IA, Klaren WD, Chappell GA, Britt JK, Rivera BN, Choksi NY, **Wikoff DS**. 2023. Updated systematic assessment of human, animal and mechanistic evidence demonstrates lack of human carcinogenicity with consumption of aspartame. Food Chem Toxicol 172:113549, [online ahead of print](#).

Doepker C, Movva N, Cohen SS, **Wikoff DS**. 2022. Benefit-risk of coffee consumption and all-cause mortality: A systematic review and disability adjusted life year analysis. Food Chem Toxicol 170:113472, doi: [10.1016/j.fct.2022.113472](#).

World Health Organization [drafting author]. Framework for the use of systematic review in chemical risk assessment. 2021.

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## SCIENTIFIC MEETING PRESENTATIONS

LaPlaca SB, Heintz MM, **Wikoff D**, Haws LC. Multi-step integration of ecotoxicological study reliability in ecological risk assessment. Poster at Society of Environmental Toxicology and Chemistry (SETAC), Philadelphia, PA, November 2022.

Fitch S, Klaren WD, Payne L, **Wikoff D**. Comparison of public and private literature databases for toxicological investigations. Poster presented at Society of Toxicology Annual Meeting, San Diego, CA, March 2022.

Panel Discussion Moderator: "Systematic Review in the Risk Assessment Community—Highlights of Key Utilities, Challenges, and Opportunities for Path Forward." The Toxicology Forum, Virtual Summer Meeting, July-August 2021.

**Wikoff D**, Fitch S, Borghoff S. Case-study applications using evidence-based approaches to assess endocrine activity for risk assessment. Invited speaker (Wikoff): 61<sup>st</sup> Annual Meeting (virtual) of the Society for Birth Defects Research & Prevention, June 2021.

**Wikoff D**, Franzen A, Chappell G, Harris M, Thompson C. Systematic characterization of hexavalent chromium and potential female reproductive outcomes: Application of US EPA critical appraisal tools and stepwise inclusion of mechanistic data. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, <https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P3209>.

Henderson RG, Franzen A, Franke K, Payne L, Schmitt D, **Wikoff D**. Creating a literature database for cannabidiol (CBD): Systematic evidence mapping. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, <https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P1236>.

Ring C, Fitch S, Haws L, Harris M, **Wikoff D**. Quantitative integration of dose-response data for relative potency estimates of dioxin-like chemicals. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, <https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P3385>.

**Wikoff D**, Erranguntla N, Lewis J, Foreman J. A fit-for-purpose framework for use of systematic methods in risk assessment. Poster at Evidence Integration in Chemical Assessments: Challenges Faced in Developing and Communicating Human Health Effect Conclusions. National Academies of Sciences, Engineering, and Medicine, Washington, DC, June 2019.

Borghoff S, Fitch S, Britt J, Franke K, **Wikoff D**. Application of the EFSA/ECHA endocrine disruption guidance as a framework for evidence integration in a weight-of-evidence (WoE) analysis for oxybenzone (BP-3). Poster at Evidence Integration in Chemical Assessments: Challenges Faced in Developing and Communicating Human Health Effect Conclusions. National Academies of Sciences, Engineering, and Medicine, Washington, DC, June 2019.

Urban J, **Wikoff D**, Haws L. Three-tiered approach to integrating evidence streams assessing gestational trichloroethylene exposure and congenital heart defects (TCE-CHD). Poster at Evidence Integration in Chemical Assessments: Challenges Faced in Developing and Communicating Human Health Effect Conclusions. National Academies of Sciences, Engineering, and Medicine. Washington, DC, June 2019.

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Borghoff SJ, Fitch S, Huggett, **Wikoff D**. A hypothesis-driven weight-of-evidence analysis to evaluate potential endocrine disrupting properties of perfluorohexanoic acid (PFHxA). 2019. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.

Ring CL, Urban J, **Wikoff D**, Thompson C, Budinsky RA, Haws LC. Application of systematic review and quantitative evidence integration methods to support risk assessment: Characterization of the dose-response relationship between exposure to dioxin-like compounds (DLC) and sperm count. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.

**Wikoff D**. Problem formulation: Lessons and tools from practical applications involving systematic review of mechanistic data. Presented at Strategies and Tools for Conducting Systematic Reviews of Mechanistic Data to Support Chemical Assessments, National Academies of Sciences, Engineering, and Medicine. Washington, D.C., December 2018.

Borghoff S, **Wikoff D**, Urban JD, Rager JE. A systematic approach to identify plausible mode-of-actions (MOA) for an increased incidence of lung tumors in mice with chronic exposure to 4-methylimidazole (4-MEI). Society of Toxicology Annual Meeting. March 11–15, 2018. San Antonio, TX.

**Wikoff D**. Moving beyond theory to the use of systematic review to support regulatory decision making for evidence-based risk assessment. Society of Toxicology Annual Meeting. March 11–15, 2018. San Antonio, TX.

Urban JD, Harvey S, Haws LC, **Wikoff D**. Assessment of study quality (risk of bias) in understanding the relationship between congenital heart defects (CHDs) and exposures to trichloroethylene (TCE). Society of Toxicology Annual Meeting. March 11–15, 2018. San Antonio, TX.

**Wikoff D**, Goodrum P, Haws L, Budinsky R. Application of quantitative approaches to assess uncertainties in the development of toxicity values: A case study involving the reference dose (RfD) for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Society of Toxicology Annual Meeting. March 11–15, 2018. San Antonio, TX.

**Wikoff DS**, Welsh BT, Henderson R, Brorby G, Britt J, Myers E, Goldberger J, Lieberman HR, O'Brien C, Doepper C. Application of systematic reviews in the evaluation of caffeine safety: Potential adverse effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. Society of Risk Analysis Annual Meeting. December 10–14, 2017. Arlington, VA.

**Wikoff DS**, Rager JE, Harvey S, Haws L, Chappell G, Borghoff S. Development and refinement of a framework for quantitative consideration of study quality and relevance in the evaluation of mechanistic data based on Key Characteristics of Carcinogens. Society of Risk Analysis Annual Meeting. December 10–14, 2017. Arlington, VA.

**Wikoff DS**, Rager J, Harvey S, Haws L, Chappell G, Borghoff S. Framework for quantitative consideration of study quality and relevance in the systematic evaluation of mechanistic data per the Ten Key Characteristics of Carcinogens. Poster presented at Society of Toxicology Annual Meeting. March 15, 2017. Baltimore, MD.

Suh M, Harvey S, **Wikoff D**, Mittal L, Ring C, Goodmanson A, Proctor D. Meta-analysis of hexavalent chromium and stomach cancer. Poster presented at Society of Toxicology Annual Meeting. March 13, 2017. Baltimore, MD.

Chappell G, Welsh B, Harvey S, Harris M, **Wikoff D**. Validation and application of a text mining tool in the identification and categorization of mechanistic data: A case study in improving problem formulation of carcinogenicity assessments. Poster presented at Society of Toxicology Annual Meeting. March 15, 2017. Baltimore, MD.

Doepker D, Tyndall K, Lane R, **Wikoff D**, Thompson C, Harvey S, Schmitt D. A proposed ADI for nitrate. Poster presented at Society of Toxicology Annual Meeting. March 16, 2017. Baltimore, MD.

**Wikoff D**, White MC, Borghoff SJ, Haws LC. Evaluation of tetrabromobisphenol A (TBBPA)-induced endocrine-related target gene activity using high-throughput screening data from ToxCast. Presented at the Society of Toxicology's 54th Annual Meeting, March 22-26, 2015. San Diego, CA.

Borghoff SJ, **Wikoff D**, White MC, Thompson C, Haws LC. Identification of the molecular initiating event (MIE) for TBBPA induced uterine tumors in the framework of an adverse outcome pathway (AOP). Presented at the Society of Toxicology's 54th Annual Meeting, March 22-26, 2015. San Diego, CA.

Haws LC, Thompson C, Perry C, White M, Fitzgerald L, Borghoff S, **Wikoff D**. Development of non-cancer based toxicity factors and daily dose estimates for TBBPA. Presented at the Society of Toxicology's 53rd Annual Meeting, March 23-27, 2014. Phoenix, AZ.

**Wikoff D**, Thompson C, Perry C, White M, Fitzgerald L, Borghoff S, Haws LC. Development of an oral cancer slope factor and lifetime average daily dose estimates for TBBPA. Presented at the Society of Toxicology's 53rd Annual Meeting, March 23-27, 2014. Phoenix, AZ.

Haws L, Fitzgerald L, Burkhalter K, **Wikoff D**. US EPA's proposed toxicity values for TCDD: Implications for decision-making regarding the safety of foods in the United States. Presented at the Society of Toxicology's 51st Annual Meeting, March 11-15, 2012. San Francisco, CA.

**Wikoff D**, DeVito M, Walker N, Hixon G, Harris M, Tachovsky A, Birnbaum L, Haws L. Application of machine learning in the development of a weighting framework for evaluating estimates of relative potency for dioxin-like compounds. Presented at the Society of Toxicology's 51st Annual Meeting, March 11-15, 2012. San Francisco, CA.

Diliberto JJ, Sirinek L, Burkhalter B, **Wikoff DS**, Hixon G, Becker J, Patterson DG, Turner W, Tachovsky JA, Birnbaum LS, Haws LC. Endometriosis in a cohort of women living in the Kanawha River Valley in West Virginia: Blood levels of non-dioxin-like PCBs and relationship with BMI and age. Presented at Dioxin 2011, August 21-25, 2011. Brussels, Belgium.

Haws LC, DeVito MJ, Walker NJ, Harris MA, Tachovsky JA, Birnbaum LS, Farland WH, **Wikoff DS**. Development of a consensus-based weighting framework for evaluating estimates of relative potency for dioxin-like compounds that includes consideration of data from human cells. Presented at Dioxin 2011, August 21-25, 2011. Brussels, Belgium.

Haws LC, Fitzgerald L, Burkhalter B, Harris M, **Wikoff DS**. Assessment of the US EPA's proposed toxicological values for TCDD for regulation of dioxin-like compounds in foods: Bridging the science divide in a global market. Presented at Dioxin 2011, August 21-25, 2011. Brussels, Belgium.

Rowlands JC, Urban J, **Wikoff DS**, Budinsky R. The presence and estimated functional effect of single nucleotide polymorphisms at the AIP, ARNT, HSP90AA1, AND HSP90AB1 loci in the human population. Presented at Dioxin 2011, August 21-25, 2011. Brussels, Belgium.

**Wikoff DS**, Thompson C, Walker N, DeVito M, Harris M, Birnbaum L, Haws L. Derivation of relative potency estimates using benchmark dose modeling: a case study with TCDF. Presented at Dioxin 2011, August 21-25, 2011. Brussels, Belgium.

Fitzgerald L, Burkhalter B, Urban J, **Staskal D**, Harris M, Haws L. VOC serum levels in the general U.S. population: An analysis of the 2003-2004 NHANES dataset. Presented at the Society of Toxicology's 50th Annual Meeting, March 6-10, 2011. Washington, D.C.

**Staskal-Wikoff D**, Budinsky R, Rowlands JC. Single nucleotide polymorphisms in the human aryl hydrocarbon receptor interacting protein (AIP) gene from six ethnic populations. Presented at the Society of Toxicology's 50th Annual Meeting, March 6-10, 2011. Washington, D.C.

Urban J, Fitzgerald L, Burkhalter B, **Staskal D**, Harris M, Haws L. BTEX serum levels in the general U.S. population: An analysis of 2003-2004 NHANES dataset. Presented at the Society of Toxicology's 50th Annual Meeting, March 6-10, 2011. Washington, D.C.

Harris M, Tachovsky JA, **Staskal-Wikoff D**, Aylward L, Burkhalter B, Simon T, Haws L. Serum concentrations of dioxin-like compounds in a population in Midland Michigan: An evaluation of the impact of soil exposures. Presented at Dioxin 2010, September 12-17, 2010, San Antonio, TX.

Harris M, Tachovsky JA, **Staskal-Wikoff D**, Simon T, Burkhalter B, Urban J, Haws L. Assessment of the impact of various soil cleanup levels on serum concentrations of dioxin-like compounds in humans. Presented at the 49th Annual Meeting of Society of Toxicology. March 7-11, 2010. Salt Lake City, Utah.

Haws L, Tachovsky JA, **Staskal-Wikoff D**, Aylward L, Burkhalter B, Urban J, Simon T, Harris M. An evaluation of the influence of different soil cleanup levels on the concentration of dioxin-like compounds in human serum. Presented at Dioxin 2010, September 12-17, 2010, San Antonio, TX.

**Staskal-Wikoff D**, Burkhalter B, Stapleton H, Harris M. PBDEs in Newark Bay sediments. Presented at Dioxin 2010, September 12-17, 2010, San Antonio, TX.

**Staskal DF**, Birnbaum LS. 2009. Screening-level assessment of risk associated with exposure to PBDEs in Vehicles. Society for Toxicology. March 15-19, 2009. Baltimore, MD.

Urban JD, Tachovsky JA, **Staskal DF**, Haws LC, Harris MA. 2009. Human health risk assessment of consumption of fish from the Lower Passaic River. Society for Toxicology. March 15-19, 2009. Baltimore, MD.

Urban JD, Haws LC, Scott LF, Scott PS, **Staskal DF**, Tachovsky AT, Unice KM, Harris MA. 2008. A framework for evaluating serum dioxin data derived from biomonitoring studies. Society for Toxicology. March 16-20, 2008. Seattle, WA.

Haws LC, Scott LLF, **Staskal DF**, Harris MA, Finley BL. 2007. Evaluation of biomonitoring data for dioxin-like compounds in workers at a primary magnesium production facility. Society for Risk Analysis. December 9-12, 2007. San Antonio, TX.

**Staskal DF**, Donovan EP, Haws LC, Roberts JD, Unice KM, Finley BL, Harris MA. 2007. A quantitative microbial risk assessment for exposure to pathogens in waters and sediments of the Lower Passaic River. Society for Risk Analysis. December 9-12, 2007. San Antonio, TX.

**Staskal DF**, Donovan E, Roberts J, Unice K, Finley B, Harris M. 2007. Human health risk associated with exposure to pathogen-contaminated sediments. Society of Toxicology. March 25-27, 2007. Charlotte, NC.



Diliberto JJ, **Staskal DF**, Hakk H, Birnbaum LS. 2007. Differential urinary protein binding of PBDEs in mice. Society of Toxicology. March 25–27, 2007. Charlotte, NC.

Emond C, Raymer J, Garner E, Diliberto J, **Staskal D**, Birnbaum LS. 2007. A physiologically-based pharmacokinetic model for developmental exposure to PBDE-47 in rodents. Society of Toxicology. March 25–27, 2007. Charlotte, NC.

**Staskal DF**, Scott LLF, Williams ES, Luksemburg WJ, Haws LC, Birnbaum LS, Nguyen LM, Paustenbach DJ, Harris MA. 2007. Daily intake estimates of PBDEs associated with consumption of catfish in the U.S. Presented at the Fourth International Workshop on Brominated Flame Retardants. April 24–27, 2007. Amsterdam, the Netherlands.

Nguyen LM, **Staskal DF**, Ferriby LL, Williams ES, Luksemburg WJ, Haws LC, Birnbaum LS, Paustenbach DJ, Harris MA. 2007. Dietary intake of PBDEs based on consumption of catfish in southern Mississippi. Presented at the Society of Toxicology's 46<sup>th</sup> Annual Meeting. March 25–29, 2007. Charlotte, NC.

**Staskal DF**, Diliberto JJ, Birnbaum LS. 2006. Effect of age on the tissue distribution of BDE 47 in mice. The Toxicologist.

Richardson VM, **Staskal DF**, Diliberto JJ, Birnbaum LS. 2006. Effects of BDE 47 on nuclear receptor regulated genes and implications for thyroid hormone disruption. The Toxicologist.

Bauer D, **Staskal DF**, Diliberto JJ, Birnbaum LS. 2005. Disposition of BDE 99 and BDE 153 in female mice. The Toxicologist.

**Staskal DF**, Diliberto JJ, DeVito MJ, Birnbaum LS. 2004. Tissue distribution and elimination of BDE 47 in mice following a single oral dose. Organohalogen Compounds.

**Staskal DF**, Diliberto JJ, DeVito MJ, Birnbaum LS. 2004. Disposition of 2,2',4,4'-Tetrabromodiphenylether (BDE 47) in Female Mice. The Toxicologist.

**Staskal DF**, DeVito MJ, Ross DG, Birnbaum LS. 2003. A comparison of the metabolism of methoxyresorufin, acetanilide, and caffeine in rat and human CYP1A2 SUPERSOMES. The Toxicologist.

**Staskal DF**, DeVito MJ, Ross DG, Birnbaum LS. 2003. Caffeine, acetanilide, and methoxyresorufin metabolism by rat and human CYP1A2 supersomes and their inhibition by 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Organohalogen Compounds.

**Staskal DF**, DeVito MJ, Ross DG, Birnbaum LS. 2002. Inhibition of human and rat CYP1A2 by TCDD and dioxin-like chemicals. The Toxicologist.

# Julie Panko, CIH

PRINCIPAL SCIENTIST  
PRACTICE DIRECTOR, EXPOSURE SCIENCES

## CONTACT INFORMATION

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## PROFESSIONAL PROFILE

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Ms. Panko has more than 30 years of experience conducting and managing a wide variety of occupational, environmental, and consumer health risk assessments and is a Certified Industrial Hygienist (CIH). She has focused primarily on evaluating chemical risks from industrial, commercial, and consumer products within the context of various regulatory programs and voluntary initiatives. Some of this work included product lines such as paints and coatings, adhesives, tires, arts and crafts, beauty care, food ingredients and many industrial process chemicals.

Ms. Panko's areas of expertise include quantitative exposure assessment such as retrospective analysis of occupational and community-based exposures to industrial emissions; human health risk assessment for contaminated sites; industrial hygiene program development and implementation; indoor air quality related to industrial, commercial, and residential environments; and product stewardship and sustainability. She has evaluated potential human health risks associated with numerous substances, including benzene, toluene, xylene, acetone, TCE, dioxin, PCBs, mineral spirits, a wide variety of metals, PAHs, perfluorinated compounds, and biologicals including fungi and bacteria.

Ms. Panko has published on the use of chemical fingerprinting and other commercially available tools to evaluate chemical risks associated with a product throughout its life cycle, providing transparent and scientific approaches to evaluating chemical substitutes. Additionally, Ms. Panko is an international expert on potential human and ecological health risks associated with non-exhaust vehicle emissions, in particular tire and road-wear particles.

## EDUCATION AND DEGREES EARNED

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1987 B.S., Industrial Hygiene, Ohio University

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**PROFESSIONAL ASSOCIATIONS AND CERTIFICATIONS**

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- 2018–present    Product Stewardship Society
- 1996, 2002, 2007, 2012, 2017    Certified Industrial Hygienist #7101, American Board of Industrial Hygiene
- 1996–present    American Board of Industrial Hygiene (ABIH)
- 1991–present    American Industrial Hygiene Association (AIHA)
- Fellow of the American Industrial Hygiene Association (FAIHA)
  - Biological Monitoring Committee, 2008–2015 — BEELs Project Team, 2008–2012
  - Stewardship and Sustainability Committee, 2008–present
    - Secretary, 2018–2019
    - Vice-Chair, 2019–2020
    - Chair, 2020
    - Past Chair, 2021–2022
- 1989–present    American Industrial Hygiene Association (Pittsburgh Local Section)
- Program Committee Member, 1991
  - President-Elect, 2003
  - President, 2004
  - Past President, 2005
  - Director, 2008–2010
- 2020–present    Society of Environmental Toxicology and Chemistry (SETAC), National
- 2020–present    Society of Environmental Toxicology and Chemistry (SETAC), Pacific Northwest; Hudson, Delaware Regional Chapters

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**SELECTED PROFESSIONAL EXPERIENCE**

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***Risk Assessment***

Evaluated the potential human and environmental health risk associated with trace levels of PFAS in fluorinated containers, including with the manufacturing and downstream users' conditions of use.

Developed an action plan to assist a client in preparing for registration of a new product as an antimicrobial under EPA's FIFRA program. Project involved evaluation of the antimicrobial mechanism of action, existing data on the physical and chemical properties of the product, toxicity information, and data gaps, as well as determination of data needs for a successful registration.

Prepared a state-of-knowledge assessment regarding tire materials throughout the life cycle of a tire, including manufacturing, in-use, and end-of life (ELT).

Assessed the state of regulation for plastic products at the global level, including global agreements through the United Nations and OECD, as well as regional regulations in North America (including various US State-level regulation and Canada Province-level regulations), Europe and Africa (including specific regulations in Denmark, Germany, Netherlands, and South Africa), Japan, South Korea, India, China, and Australia.

Prepared a state-of-knowledge report regarding the potential for human and ecological health risk associated with brake-wear particles in the environment.

Evaluated the fate and transport of tire and road-wear particles in the environment from release on road to transport to estuarial waters.

Designed and directed ambient air sampling programs to quantify tire and road-wear particles (TRWP) in the PM<sub>10</sub> and PM<sub>2.5</sub> fractions. These programs included air sampling in several cities in France, the United States, and Japan, as well as London, England, and Delhi, India. These data have been used to characterize human health risk from inhalation of TRWP in the ambient outdoor air.

Evaluated hazard warnings and signage requirements for petroleum refineries, logistics terminals, and retail outlets related to California Proposition 65 regulations.

Determined notification threshold values for air pollutants to be used in the evaluation of fence-line monitoring data at a refinery.

Compiled and reported on the state of knowledge regarding the potential for human health and ecological risk associated with the use of crumb rubber in artificial turf fields and playgrounds.

Developed analytical data packages to support REACH registration of 10 substances used in adhesive products. Work involved determination of appropriate laboratory testing procedures and evaluation of the laboratory data to assess the “sameness” of the tested substances to those already registered under REACH.

Developed and managed an outdoor ambient air monitoring study to characterize the air concentrations of several gaseous and particulate substances and the potential for human health impacts during development and production of an unconventional natural gas well site in Middlesex Township, Pennsylvania. This project involved establishing four stations located upwind and downwind of a well pad for air monitoring of the baseline, as well as where monitoring was conducted during baseline conditions prior to development of the well pad and operational phases, including completions, dewatering, flowback, production, and initial well-pad deconstruction activities. Constituents of interest included real-time continuous monitoring of PM<sub>10</sub>, PM<sub>2.5</sub>, total VOCs, NO<sub>2</sub>, CO, and H<sub>2</sub>S. Routinely collected samples for speciated VOCs over various time periods, including 15 minutes, 8 hrs, and 24 hrs, over the course of the project.

Evaluated potential for air impacts and human health risk associated with construction and development of an unconventional natural gas well pad in western Pennsylvania. This project involved analysis of local air monitoring data and evaluation of well-site activities and potential air emissions, critical evaluation of the published literature on health risks associated with natural gas development, and presentation of the analysis at a local zoning board hearing.

Evaluated the potential health risk associated with the use of 4-tert-octyl phenol in a rubber resin compound throughout the life cycle of the rubber product.

Conducted a comparative analysis of 32 publicly available chemical hazard assessment tools to characterize the strengths and weaknesses of each, and to describe the ability of each tool to generate a risk profile for a chemical or product.

Evaluated the contribution of various anthropogenic sources of black carbon to the ambient outdoor air, including an in-depth assessment of EPA’s MOVES model and inputs for non-exhaust vehicle emissions.

Provided senior technical review of endocrine disruption testing of two chemicals used in rubber products. This testing was conducted to fill data gaps for each chemical and followed the USEPA Endocrine Disrupter Screening Program guidance.

Developed and implemented an ambient air monitoring program for a school district in southwestern Pennsylvania, to assess potential risk to children on the campus due to hydraulic fracturing activities at a nearby gas-well installation. The program included installation of direct-reading instruments to measure, in real-time, VOCs and flammable gases, placement of a local weather station to record meteorological data, and collection of ambient air samples to identify and quantify specific VOCs. The program included baseline conditions evaluation and air monitoring/sampling during fracturing of the well and the flaring phase prior to gas production.

Managed a project to assess the cardiopulmonary hazard potential of TRWP. The work involved the collection and subsequent size separation of TRWP for use in a nose-only subacute inhalation rodent study. As part of the overall hazard evaluation, a comparative *in vitro* study was also conducted to assess the relative potency of TRWP to other known substances and their potential to induce adverse effects.

Managed the development of outdoor air monitor concentration objectives for an MGP site prior to remediation activities. The MCOs were developed as health-based levels designed to be protective of people working, living, and recreating in the areas adjacent to the site.

Developed exposure scenarios and a risk characterization under REACH for a new chemical to be placed on the European market in 2011. Unique aspects of this assessment include the classification of the chemical as a compound of unknown, variable composition.

Managed and directed a project involving chemical designation requirements for a Fortune 100 firm. This included updating relevant international chemical regulations, determining chemicals affected by the regulations, and establishing the restriction of use for certain chemicals.

Evaluated the PBT assessment (for substances that are persistent, bioaccumulative and toxic) of an antioxidant compound used in rubber polymer applications that underwent evaluation in Canada, to identify limitations of the assessment and identify data gaps that, if filled, would reduce the uncertainty of the assessment and provide a more scientific basis for the classification.

Developed a chemical review program for a Fortune 100 manufacturing firm to provide a scientific basis for accepting or rejecting new proposed raw materials at various stages in the research and development process. This program included consideration of the potential chemical risks associated with the manufacturing, in-use and end-of-life portions of the product's life cycle.

Evaluated outdoor air dioxin emissions from a petroleum refinery and potential impacts on the surrounding community.

Managed and directed technical research for an international consortium of tire manufacturers to assess sustainability issues for their global industry. The project has involved review of all available data to assess potential human and environmental health risk issues associated with the primary raw materials and potential releases to the environment from the product manufacturing and use sections of their products' life cycles. The objective of the project is to determine the state of knowledge regarding human and environmental health and exposure information, identification of data gaps, and development and implementation of a research program to acquire sufficient information to conduct a thorough environmental health risk assessment.

Managed and conducted independent, third-party peer review of risk assessment reports and ambient air monitoring data on behalf of the Nevada Department of Conservation & Natural Resources, Division of Environmental Protection (NDEP), for a large remediation site in Henderson, Nevada.

Managed and directed evaluation of a PCB-impacted high-rise commercial office building in Japan. Work involved sampling design and risk assessment protocol to evaluate the potential for human health risk associated with PCB-impacted surfaces within the building and building systems.

Provided technical oversight and direction for development of exposure scenarios associated with tire and general rubber goods manufacturing on behalf of the European Tyre and Rubber Manufacturing Association (ETRMA). The exposure scenarios support REACH compliance efforts by the chemical suppliers to the tire and rubber manufacturers.

Managed a historical exposure reconstruction of residents in Ohio and West Virginia who were exposed to perfluorooctanoic acid (PFOA) from ambient air releases by a fluoropolymer manufacturing facility that operated in the area for 53 years. The retrospective exposure analysis required the estimation of historical releases to the environment using a mass-balance approach, followed by quantification of PFOA in various environmental media using air dispersion, soil, groundwater, and surface-water models. The results of the exposure analysis provided a picture of likely residential exposures to PFOA in the nearby communities over time.

Managed a historical exposure reconstruction of residents living near a former manufacturing facility in New York, as part of litigation brought by plaintiffs who claimed medical impairments due to their presumed exposure to TCE via indoor vapor intrusion from affected groundwater. The retrospective exposure analysis involved modeling likely historical groundwater concentrations and subsequent indoor vapor intrusion. The result was a bounding estimate of likely TCE exposures over time.

Assessed potential for exposure to TCE in a school as a result of vapor intrusion from contaminated groundwater. The assessment included evaluation of indoor air monitoring data, analysis of TCE plume migration, and modeling of groundwater and indoor air to predict future TCE concentrations.

Managed and directed various human health risk assessments of residential and commercial properties located near former manufactured gas plant (MGP) sites. Evaluated environmental data related to the former site and community areas and conducted human health risk assessments of individual properties, including environmental fate and transport modeling of soil and groundwater contaminants. Provided support to legal counsel in expert deposition and prepared expert reports for the defense.

Managed and directed a human health risk assessment of remedial actions to be taken at a former manufactured gas plant (MGP) site. Characterized potential risks to the community resulting from excavation of affected soils and historical operations structures. Also determined acceptable fence-line air concentrations of site chemicals of concern for use in comparing perimeter ambient air samples to be collected during site remediation.

Managed and directed exposure assessments to evaluate children's exposure to benzene, toluene, xylenes, and acetone. These projects are being conducted on behalf of the Benzene, Toluene and Xylene Exposure Assessment Voluntary Children's Chemical Evaluation Program (VCCEP) Working Group of the American Chemistry Council (ACC) and the ACC Acetone VCCEP Panel. The VCCEP projects involved the development of specific exposure scenarios to assess the manner in which children and prospective parents may be exposed to chemicals in their daily life. Contributions from the ambient outdoor air and indoor residential and school settings, as well as microenvironments through the use of consumer products, were accounted for and quantified. Presented results to a technical peer-review panel sponsored by the USEPA.

Assessed potential dioxin exposures from a former wood-treating facility in Alabama, including evaluation of environmental samples of soil, sediment, and house dust, as well as human blood analysis for dioxin compounds.

Assessed potential exposures to formaldehyde in a residential setting. Project involved claims of alleged exposure to formaldehyde from kitchen cabinets and subsequent adverse health effects. Work involved evaluation of an urban home setting and indoor air modeling of formaldehyde from theoretical releases via off-gassing from the cabinets.

Provided technical assistance on a litigation project involving historical airborne releases of dioxin from a secondary copper smelter. Developed strategy for the company in terms of assessing historical exposures, educating the client on the usefulness of biomonitoring for historical exposure assessment, and general toxicity and exposure assessment strategies for managing potential dioxin exposures.

Directed and managed the evaluation of a building affected by the collapse of the World Trade Center in September 2001 on behalf of an insurance company. This project was conducted as part of litigation brought by the building owner against their insurance company. The claim was that WTC dust had entered the interstitial wall cavities of all partition walls, thereby requiring a gut rehabilitation of the building. Analyzed more than 25,000 environmental samples, with an associated 100,000 chemical analyses, assessment of human health risks under a variety of scenarios, and development of an original WTC dust signature to determine the potential for WTC dust impacts throughout the building. The suit was settled following formal mediation with the building owner.

Managed a human health risk assessment for a former integrated iron and steel facility in New York. Evaluated more than 104 Solid Waste Management Units (SWMUs) and 5 water courses for human health risk based on the chemical constituents identified at the site. Determined health-protective remediation goals for chemicals of concern in compliance with the EPA's Administrative Consent Order (ACO). Primary chemicals of concern were benzene in groundwater and PAHs related to various process waste streams and coal tars. Both site-wide and SWMU-specific human health risk assessments were conducted. Interacted with both USEPA Region 2 and the New York State Department of Environmental Conservation (NYSDEC) as progress was made in moving the site from closure in the RCRA Corrective Action Program to redevelopment within NYSDEC's Voluntary Cleanup Program.

Managed a human health risk assessment for a former waste deposit area at an integrated iron and steel manufacturing facility in Indiana. This risk assessment was performed at the request of USEPA Region V to assess potential human health risks, if any, associated with exposure to chemical constituents detected in the waste material. The property was proposed to be preserved as a natural habitat, with possible use as an environmental education center for the long-term study of restoring industrial lands for natural habitat. As such, this risk assessment focused on potential exposures to future site users, including an environmental educator and environmental student, as well as a trespasser. Unique challenges included exposure frequencies and durations atypical of commercial/industrial and residential scenarios. Twenty-one constituents in the waste material were evaluated quantitatively for potential human health hazards via direct contact with the sludge, including inhalation of sludge particulates and inhalation of vapors.

Managed and conducted independent third-party peer review of risk assessment reports on behalf of the Pennsylvania Department of Environmental Protection (PADEP) when they seek external peer review of risk assessments that have been submitted for sites undergoing closure through the Pennsylvania Land Recycling Act (Act 2). The reviews involved the evaluation of the site-specific risk assessments for scientific validity and completeness. Examples of risk assessments reviewed include those for a former steel slag landfill, former petroleum products storage facilities, gas stations, and miscellaneous manufacturing sites.

Managed the development of a database of exposure parameters to be used in conjunction with various reference scenarios to estimate potential monomer exposures to end users of products containing acrylate/methacrylate polymers. This project was conducted on behalf of the Basic Acrylic Monomer Manufacturers/Methacrylic Producers Association (BAMM/MPA). The database contained over 300 exposure parameters that can be used in conducting exposure assessment using various exposure assessment models, including Promise, EASE, Consexpo, Wall-Paint Exposure Model (WPEM), and others.

Provided review and comment to the Western States Petroleum Association on a diesel school bus exposure study. The study focused on the nature and extent of children's exposure to diesel-related pollutants while commuting to school.

Conducted a human health exposure assessment to evaluate the potential for residential exposure to elemental mercury vapors from an indoor release of mercury. The primary objective of the project was to determine appropriate screening criteria for use in deciding the need for further evaluation and/or remedial activities in a home. In support of the criteria determination, a mathematical model was developed that could be used to predict elemental mercury vapor concentrations over time after an indoor release. Included in this model are a mercury emissions rate module and an indoor air quality module. The exposure assessment also included a review of

USEPA's elemental mercury inhalation reference concentration (RfC), case studies from the scientific literature, and screening criteria used by various governmental agencies for decision making.

Evaluated historical industrial hygiene data for the purpose of exposure reconstruction, participated in a retrospective epidemiology study of workers to determine lung cancer mortality rates, and assisted in dose-response modeling to determine the increased risk of lung cancer from exposure to hexavalent chromium. Studied nearly 30 years of industrial hygiene data and employment records for more than 1000 workers. Estimated lung cancer potency of hexavalent chromium using cancer dose-response modeling. The results serve as a primary study in OSHA's revised Permissible Exposure Limit (PEL) for hexavalent chromium

Participated in the development and presentation of an alternative to USEPA's inhalation reference concentration (RfC) for hexavalent chromium. Specific tasks included preparation of a summary document detailing the literature review, selection of critical studies, selection of critical effect, compilation of benchmark dose-response modeling results, and derivation of RfC based on applicable uncertainty factors. The important aspect of this project was demonstrating that hexavalent chromium inhalation toxicity standards should differentiate between chromic acid (mostly an occupational exposure) and chromate particulates typically found in the environment. The alternative value was reviewed, critiqued, and approved by an independent expert panel and has been published on the International Toxicity Estimates for Risk (ITER) internet database.

Participated in risk assessments for three chromium-impacted sites in New Jersey. Identified chemicals of interest (COIs), evaluated the hazard potential for each, developed an exposure scenario and characterized risk. Prepared public relations fact sheet describing the site investigations conducted at various contaminated sites. Also, for one of the sites, calculated toxic equivalency factors for PCB congeners found in contaminated river sediments and compared sediment and biota data to those of a food-web model, to better refine the human health risk assessment.

Conducted a human health risk evaluation of a residential population potentially exposed to volatile and explosive vapors present in their homes as a result of a contaminated groundwater aquifer. The contaminated aquifer was a result of a former oil refinery and fuel storage facility located in Heath, Ohio. Conducted air monitoring inside basements or crawlspaces of homes located above the contamination plume, and also in homes outside the bounds of the plume. Extensive risk communication was conducted during resident interviews; results were reported and toll-free hotlines established in conjunction with the local health department.

### **Industrial Hygiene**

Evaluated occupational exposures to phthalic anhydride in the chemical manufacturing industry. The project was conducted on behalf of phthalic anhydride manufacturers to assess existing data sets and determine the utility of the data to support EPA's exposure assessment for the manufacturing condition of use as part of the agency's TSCA Risk Evaluation for phthalic anhydride.

Evaluated potential occupational exposure to hexabromocyclododecane (HBCD) from its prior use as a flame retardant in certain building insulation materials during construction and demolition conditions of use.

Developed conceptual exposure model and evaluated occupational and potential consumer exposures to 1,3-butadiene in the chemical manufacturing and selected downstream user industries. The project was conducted to provide exposure measurement data to EPA in support of the agency's TSCA Risk Evaluation for 1,3-butadiene.

Evaluated nearly 2,000 formaldehyde air sample results to characterize worker exposures to formaldehyde in the tire manufacturing industry. This project was conducted to provide industrial hygiene data to EPA in support of the agency's TSCA Risk Evaluation for formaldehyde.

Conducted a retrospective exposure assessment for aircraft manufacturing workers to hexavalent chromium. This project involved the use of site-specific and industry-wide industrial hygiene data to characterize exposures to workers during various activities, including painting, sanding, assembly, and anodizing/electroplating.



Evaluated adequacy of safety data sheets and associated hazard classifications for a variety of chemicals in adhesive and coating products.

Evaluated the appropriateness of various products used to disinfect airplane cockpits and cargo areas to protect pilots from the virus that caused Covid 19 disease.

Conducted a lead exposure assessment of workers in a semi-conductor fabrication facility. Focused on dermal and incidental ingestion routes of exposure and included the collection of nearly 300 surface wipe samples, calculation of daily intake via skin contact and ingestion for 14 different worker exposure groups, and modeling of blood lead levels using EPA's adult lead model.

Evaluated the potential for exposure to benzene for laboratory workers at a chemical manufacturing facility from use of reagent-grade benzene.

Evaluated the potential for chemical exposures of a worker employed as a printer who used ink systems designed to print on flexible packaging.

Evaluated the potential for worker exposures to trace chemicals in fire suppression foam subsequent to deployment in an aircraft hangar during aircraft manufacturing.

Provided risk communication to employees at an aircraft manufacturer related to potential for exposure to cadmium released as dusts or fumes created from grinding, sanding, welding, cutting, or heating cadmium-plated parts. As part of this project, a Frequently Asked Questions (FAQs) document was prepared to help the workers understand where exposures might occur in the workplace, what the health effects are from cadmium exposure, and ways to protect themselves and minimize exposures.

Evaluation of workers' exposure potentials to chemical components of a flavorant used in pet foods. Full-shift and short-term exposures were measured during weighing of dry ingredients, dispensing and weighing of liquid ingredients, transfer of flavor compound to mixing vat, and mixing and processing of food.

Evaluated the potential for indoor mold sources in private residences associated with a university's housing system. This project involved review of data collected by several IAQ consultants.

Conducted indoor air monitoring for formaldehyde in a private residence to assess potential for exposure from installation of injectable polyurethane foam into an existing structure.

Directed the development of an exposure assessment system to characterize chemical exposures and physical hazards such as noise to workers in a large petroleum refinery. Project included review of the refinery chemical inventory for both produced and used chemical products, preliminary assignment of similar exposure groups, prioritization scheme for chemical hazards based on NIOSH exposure-banding protocols, development of an electronic tool to provide overall risk rankings, and design and implementation of a qualitative exposure assessment program.

Provided senior oversight and technical review of an industrial hygiene protocol to assess worker exposure to airborne cobalt in anticipation of new occupational exposure limits (OELs) that have been proposed to be protective of lung cancer. Project involved evaluation of analytical methods and sampling strategies necessary to confidently quantify very low amounts of cobalt in air.

Evaluated the adequacy of a finished wood product safety data sheet (SDS) with respect to hazard warnings for formaldehyde, including determinations of trace quantities and potential for exposure from use of the product.

Designed and directed an observational study of workers handling tires to determine hand-to-mouth contact frequency. Observed workers at a tire warehouse and several tire service centers. Used the data to assess worker exposure to California Proposition 65 chemicals from tires.

Designed and directed a metal fume exposure assessment of welders, non-welder metal workers, and bystander employees in a small metal fabrication facility. Personal and area air samples of specific metal fumes and total and respirable dust were collected and analyzed to characterize the magnitude of exposures.

Evaluated more than 300 refinery company SDSs for intermediate and finished products to identify potential duplicates and outdated versions. This project involved compilation and analysis of SDSs from three refinery companies following merger/acquisition, to determine whether products were the same based on disclosed hazardous ingredients by CAS # and hydrocarbon stream identifiers.

Directed industrial hygiene field team in assessing biological contamination of a data center resulting from sewage pipe backup.

Provided senior oversight on an evaluation of benzene exposures at a liquefied natural gas facility, including onsite air monitoring and development of a benzene compliance program.

Evaluated potential for worker exposure to hexavalent chromium associated with gas turbine equipment removed from service during a routine outage at a power plant and refurbishment of the equipment at a machine shop. Also assisted the turbine manufacturer with risk communication and outreach to affected employees

Directed a field team of industrial hygienists during turnaround operations at a petroleum refinery. Characterized chemical exposures, including various hydrocarbons, asbestos, welding fumes, silica, hydrogen sulfide, nickel carbonyl, and hydrogen cyanide, as well as various safety issues such as PPE, confined-space entry, and noise.

Evaluated potential chemical exposures of operating-room personnel during various surgical procedures. Employed various air sampling techniques to identify and quantify the chemicals present in surgical smoke plumes that reach the breathing zone of the worker.

Assessed the potential for worker exposure to barite during unloading operations at a storage tank on an unconventional natural gas well site. Used mathematical models to estimate air concentrations of barite and evaluate potential health risk associated with the exposure.

Evaluated the potential for worker exposure to mold following water intrusion into several buildings on a company's headquarters campus. Inspected buildings and offered recommendations for remedial options and post-remediation air sampling for biologicals. Developed and executed employee risk communication plans, including information sheets and in-person staff meetings, to address questions regarding potential for health risk.

Managed and provided technical direction for toxicology summaries of various constituents in petroleum streams. The summaries provided supplemental information on the Safety Data Sheets for the products.

Conducted a proactive assessment of the potential for legionella contamination of a potable water system in a hotel that often houses immunocompromised individuals during treatment at a nearby hospital.

Prepared an internal corporate standard for the adoption of occupational exposure limits for a large industrial client. Although there are federal and some state-mandated occupational exposure levels (OELs) for a limited number of chemical substances, various non-regulatory organizations also develop OELs that may vary significantly in terms of the absolute value and the scientific approaches used to establish them. Because no single organization has developed OELs for all chemicals used at company sites, and because reliance on OELs set by only one organization might not be appropriate, a standard was developed to establish a uniform and transparent system to select internal OELs to be used at the company sites.

Evaluated the contamination of a cooling-water tower that was part of a new HVAC system serving a large technology data center. Collaborated with the building owner, HVAC contractor, and company operations director to verify that the building HVAC system had not been compromised.

Evaluated the potential for worker and building occupant exposures to crystalline silica during and after installation of off-spec product. This project was initiated after customers observed excessive dust in their work spaces following installation of a building material. Subsequent to company investigations, it was determined that off-spec

product had been installed in certain locations. Therefore, to understand potential human health risk and the possible need for risk management measures, personal and area air sampling was conducted to evaluate potential exposures of the installers to crystalline silica during simulated installation and removal activities with the affected products.

Evaluated worksite conditions and potential for worker exposure to chemicals at a natural gas well site in West Virginia.

Directed and managed baseline exposure assessments at six petroleum refineries. Project involved qualitative and quantitative assessments of chemical and physical stressors for all occupations throughout the refinery, development of similar exposure groups, and qualitative ranking of risk by job category. The qualitative assessment included review of processes and interviews with representatives from each job title to assess exposure duration and frequency of routine operations and specific work tasks.

Evaluated the potential for worker exposures from installation of two building material products with different quartz contents. Personal and area air sampling was conducted to evaluate potential crystalline silica and mineral wool fiber exposures of the installers during simulated installation and removal activities with the two different products. This information was used to determine labeling requirements for the products.

Evaluated workplace conditions at a flavoring and fragrance manufacturing facility to characterize the adequacy of engineering controls with respect to minimizing employee exposure to diacetyl, acetic acid, acetoin, acetaldehyde, butyric acid, and benzaldehyde in a mixing room and during packaging of products. Assessed the knowledge over time of the health hazards associated with the chemicals and various aspects of hazard communication, including safety data sheets and labels.

Evaluated the indoor environmental quality of a university research lab and office building following a fumigation project involving chlorine dioxide gas for mitigation of pinworms. The purpose of the evaluation was to examine the property conditions associated with ongoing employee health complaints and to determine whether the space could be reoccupied. Measured indoor air quality (IAQ) parameters, including temperature, relative humidity, carbon dioxide, carbon monoxide, and ultrafine particles. Surface-dust evaluation included measuring the pH of various surfaces within the offices and analyzing tape-lift samples for particle characterization.

Performed a health risk evaluation of office space leased by a medical insurance company. The purpose of the evaluation was to examine the property conditions that may have been associated with prior employee health complaints and to determine whether the office space is ready for re-occupancy. This study included an evaluation of the HVAC system, review of pesticide applications, measurement of indoor air quality parameters, air sampling for VOCs and particulates, and characterization of surface dust on desks, chairs, carpet, filing cabinets, HVAC system components, and above ceiling tiles that made up the return-air plenum.

Directed and managed a retrospective exposure assessment of workers potentially exposed to dioxin and furans from contamination of an imported raw material. Assessed product testing data, historical work practices, engineering controls, and worker PPE. Risk communication sessions were held with employees on each shift to inform them of the product contamination and discuss potential health risks associated with exposure to dioxin and furans. Subsequently, designed and implemented a biomonitoring program for workers who requested testing.

Technical lead on an evaluation of worker exposure to dioxin and furans from ball clay in a manufacturing environment, including both inhalation and dermal routes of exposure. Collected personal air samples using a mini-polyurethane foam (PUF) sampling train, and samples were analyzed using modified method TO-9. Dermal exposure was assessed through collection of wipe samples from accessible surfaces in various work areas.

Provided technical oversight/direction for an assessment of occupational exposure assessment to nano-sized particles of carbon black and amorphous silica. This project involved development of novel sampling techniques and analytical methods to understand the potential for exposure.

Global assessment of the design, management, and implementation of a chemical risk management program for a multi-national tire manufacturing company. Reviewed written corporate-level programs and exposure assessment tools, as well as on-site audits of representative facilities.

Evaluated worker exposures to asbestos and various chemicals associated with tire manufacturing operations of a factory in Europe. Conducted a retrospective exposure analysis, including assessment of operations involving talc, reactive chemical substances, and rubber curing fumes.

Studied worker exposures to isocyanates in connection with a roof replacement job where roofing adhesive leaked into the occupied space because of gaps in the roof structure. Reviewed the isocyanate literature and evaluated the possible emission rate of isocyanates from the adhesive product.

Conducted a retrospective evaluation of potential benzene exposures from the use of paint strippers containing trace amounts of benzene.

Principal-in-charge of a benzene exposure reconstruction for refinery workers in a petroleum company. This project involved multiple refineries and the evaluation of more than 30 years of industrial hygiene exposure measurements from each refinery. Benzene exposures of workers in various jobs/locations within the refineries were quantified by evaluating short- and long-term exposures.

Conducted a retrospective quantitative exposure assessment of benzene concerning a diesel mechanic who worked at an outside repair yard. Evaluated the published literature regarding exposures of diesel mechanics and estimation of inhalation and dermal exposure to benzene from use of gasoline in a bucket while performing manual parts cleaning.

Conducted a retrospective quantitative exposure assessment of benzene concerning a contract boilermaker/pipefitter who worked at oil refineries and petrochemical plants. Reviewed the published literature regarding potential benzene exposures over time and evaluated the company's health and safety program.

Retrospectively evaluated the potential for benzene exposure of mechanics using a remote-reservoir parts washer containing recycled solvent. Evaluated historical company documents regarding the benzene content of their product over time, developed exposure scenarios to represent the historical workplace conditions, and conducted mathematical modeling of potential benzene exposure via inhalation and dermal contact. Assessed the state of the art of hazard communication for the solvent, including safety data sheets and labels.

Conducted retrospective quantitative exposure assessment to benzene for an operator at an aerosol can manufacturing facility. This project involved the use of typical industrial hygiene exposure models, along with an understanding of the potential sources of exposure to solvents used as coating agents and cleaners, the historical benzene content of the solvent products, and process-specific information related to the operator's activities.

Conducted a retrospective quantitative exposure assessment of an aircraft painter's exposure to benzene. Used typical industrial hygiene exposure models, along with an understanding of aircraft-painting procedures, products used, and ventilation characteristics of the aircraft hangar in which the painter performed his duties.

Retrospectively evaluated the potential for a pressman to be exposed to benzene during use of printing solvents while working on five-color and single-color presses. Exposures evaluated included application of solvents to the rubber blankets, plate washing, roll cleaning, ink-fountain cleaning, and gumming of plates.

Evaluated potential benzene exposures of workers using trace-benzene-containing products. Conducted a comprehensive search of the published and gray literature and quantified exposures using measured data when available, modeling exposure concentrations when studies involving specific solvent-based products were not available. Results of the project indicated that, in most instances, workers using petroleum-based solvents in which the benzene content of the product is less than 0.1% have not been exposed to benzene at levels exceeding the OSHA PEL as an 8-hr TWA.

Managed and directed exposure reconstructions for workers exposed to benzene from use of a rust removal/penetrant product. Reconstructed activity and product use patterns of the workers in various work

environments, used simulation study data and indoor air models to understand likely airborne concentrations of benzene, and combined the exposure data with work history information to determine cumulative benzene exposures.

Managed and provided technical direction on a litigation support project involving remediation of a building in Lower Manhattan following collapse of the World Trade Center towers on September 11, 2001. The project involved the analysis of approximately 100,000 environmental samples collected from the building, interpretation of the sample results, preparation of a human health risk assessment, and critical review of the building owner's selection of remediation measures.

Participated in a simulation study to understand potential asbestos exposures while unpacking boxes of asbestos brake shoes and pads. Work involved the oversight of industrial hygiene sampling technicians and the measurement of air exchange rates in the building.

Participated in a simulation study conducted to understand potential asbestos exposures during removal and repair of asbestos brakes on historical automobiles. Work involved oversight of industrial hygiene sampling techniques and the measurement of air exchange rates in the building.

Participated in a study of biological markers of exposure and effect as part of litigation support for a rubber polymer manufacturer. Evaluated airborne exposure to 1,3-butadiene in relation to previously identified biomarkers of exposure (hemoglobin adducts and urinary metabolites) and hypothesized biomarkers of effect (hprt mutations). The purpose of this work was to support the client in anticipation of legal proceedings following a study of their workers by an independent researcher. Specific tasks included evaluating and commenting on the outside research team's study protocol; industrial hygiene oversight of the study, including collection of air samples for 1,3-BD, and urine and blood samples for the biomarker evaluations; and risk communication to the workers regarding the results of the study.

Managed and directed indoor air quality assessments on behalf of an international bank in their leased spaces at One Liberty Plaza and One World Financial Center following the collapse of the World Trade Center towers on September 11, 2001. Quantified indoor surface and airborne asbestos fibers, particulates (PM2.5, PM10, and ultrafines), lead, chromium, dioxin, PCBs, and mold. More than 250 samples were collected to evaluate the space prior to reoccupancy and in support of ongoing ambient indoor evaluations. Unique challenges to this project were numerous and included negotiation with building owner and insurance carriers for clean-up remedies; defining "contaminated"; risk communication to employees regarding EPA data, NYC Department of Health Data, and news reports; HVAC system operations/failures; and education of company executives in the evaluation and control of indoor air quality.

Managed and served as technical lead on more than 50 indoor air quality investigations, including those in commercial spaces (banks and offices), industrial facilities (chocolate manufacturer and printing operation), schools, and residential buildings (apartments and homes). Occupant complaints have included occupational asthma, odor annoyances, alleged increased cancer incidences, and general sick-building syndrome. The investigations included air sampling for typical indoor air quality indicators (CO, CO<sub>2</sub>, temperature, and humidity), ventilation system assessments, microbiological air and surface sampling, legionella sampling in potable and non-potable water systems, medical record reviews, and risk communication.

Provided expert witness testimony to assist in the defense of a school district in a legal complaint regarding mold contamination of a school and the potential health risk to a child. Reviewed plaintiff's expert's depositions and results of indoor air quality studies performed at the school, and submitted a written opinion regarding the remediation efforts to address indoor mold contamination.

Investigated odor complaints from offices within the Pentagon following reconstruction of the wedge damaged during the terrorist attacks of September 11, 2001. Odors were found to be originating from the floor level, and further investigation revealed mold growth beneath the carpet floor tiles. Project included sampling of the tiles to

confirm mold growth and designing remediation strategies to remove the affected materials and restore the office spaces for use by Pentagon staff.

On behalf of a private banking institution, investigated the extent of potential mold contamination in a private residence to determine whether remediation strategies were necessary. Reviewed previous testing results, conducted building walk-through with remodeling contractors, and some completed additional testing of building materials for mold contamination.

Managed and directed an investigation of a potential Legionellosis case involving an employee working in a bank building. Work included sampling of building's water systems for legionella contamination, design of appropriate cleaning protocol for the non-chemical water treatment systems in the award-winning "green" building, and follow-up monitoring of cooling towers.

Managed and provided technical oversight for development of an indoor air quality monitoring program to evaluate the potential for indoor air quality impacts during application of an acrylic roofing sealant to a large, five-story, award-winning "green" office building. To address potential complaints by building occupants, monitoring was performed for sealant chemicals with low odor thresholds.

Managed and led a team that designed an indoor air quality sampling program to address employee complaints of airborne carpet fibers negatively affecting building air quality. Work on this project included collection of samples to compare the air concentration of fibers in the complaint area versus a background area, using phase contrast microscopy and polarized light microscopy to compare the composition of airborne fibers to that of a bulk carpet sample.

Served as technical lead for a team performing an indoor microbiological study of the potential for indoor mold and other aspects of indoor air quality in the building to affect the health of students, teachers, and administrators. Results of the sampling were used to advise the school district in appropriate remediation of building materials and improvements to the ventilation system.

Served as technical team leader on the development of an Indoor Air Quality Training program for a county school system in Tennessee. The training included modules for administrators, teachers, and janitors, as well as a module for school maintenance staff.

Provided senior technical review of indoor air quality projects for the El Paso Independent School District. Work conducted for this client included indoor air quality evaluations at various district-operated facilities, including elementary schools, middle schools, high schools, and ancillary management offices and support buildings.

Conducted a comprehensive indoor environmental quality survey at a research/data processing facility in response to employee concerns of a perceived increased rate of cancer among co-workers. The project involved implementation of an indoor air quality (IAQ) screening, including a ventilation evaluation, air sampling for typical IAQ indicators, review of chemical usage in the building, and review of selected employee death certificates to determine cancer type. Following the building evaluation, an employee communication seminar was conducted to discuss findings of the survey and various cancer risk factors. The employee concerns were alleviated through the seminar, allowing work in the facility to resume.

Conducted an indoor air quality evaluation at a chocolate manufacturing facility in response to an employee worker's compensation claim of occupational asthma. The scope of the project included a ventilation system review, IAQ indicator screening, review of employee medical test results and lifestyle characteristics, and microbiological air and bulk sampling of suspect liquid material and solid surfaces within the ventilation system of one of the employee's work areas. The results of the IAQ evaluation and medical records review indicated that the workplace was not the likely source of the employee's asthma.

Performed an IAQ screening of a mid-rise office building in downtown Nashville to determine whether the building exhibited any conditions that could be a source of future complaints from building occupants. The screening consisted of a comprehensive HVAC system review and estimation of % outside air to the occupied spaces. Also,

measurements of typical IAQ indicators were made and helped to verify the results of the HVAC system review. Additionally, sources of potential chemical exposures, including a photo-developing center, were evaluated.

Evaluated the indoor air quality of office space in Nashville. The purpose of the study was to verify/compare results obtained by a previous IAQ assessment of the space. The project involved the measurement of typical indoor air quality parameters, HVAC system evaluation, air sampling for volatile organic compounds, and bioaerosol sampling. Follow-up work involved coordination with the building's HVAC contractor to evaluate the delivery of outside air to the indoor space. The results of the study indicated that the HVAC system was performing as designed, but that modifications to the interior space may affect localized performance. Other test results refuted the findings of the previous study.

Managed an exposure reconstruction conducted in support of a paper manufacturer for a potential product safety case. This project involved an exposure assessment of potential respiratory and skin irritants associated with standard white copy paper. A simulation study of the alleged exposure scenario was conducted, and air samples were collected in an effort to identify any potentially responsible chemical agents. Samples of the paper were also analyzed to attempt to correlate air sampling results to chemical constituents of the paper.

Served as the Health and Safety Manager for 200+ site investigation/remediation projects. As the HSM, responsibilities included employee training, preparation of health and safety plans, on-site monitoring, and accident investigation.

Conducted air monitoring for airborne asbestos before, during, and after abatement activities in more than 100 facilities, including schools, industrial/commercial buildings, prisons, hospitals, and demolition sites.

Conducted bulk sampling of asbestos-containing building materials in public and private facilities, including schools and industrial/commercial buildings.

### ***Environmental Assessment***

Evaluated the potential exposures to chlorinated compounds of residents via vapor intrusion from affected groundwater in an Indiana community.

Evaluated the potential for exposures to dioxin and dioxin-like compounds in a residential area in Texas following a chemical fire at a nearby chemical manufacturing facility.

Evaluated safe distances associated with a planned residential development located near a semi-conductor facility and a wastewater treatment plant.

Developed a process to determine whether a consumer chemical product can be claimed as biodegradable and whether the claim should be qualified or unqualified according to regulations established by the Federal Trade Commission. Additionally, this project involved the assessment of more than 2,000 chemical ingredients using QSAR models, because the substances lacked experimental data for biodegradation.

Managed and directed a state-of-knowledge report on rubber-tree farming to characterize the extent and expansion of rubber-tree cultivation in various growing regions, the potential for environmental and social impacts, and the government programs that incentivized various cultivation methods.

Managed and directed an evaluation of the potential contribution of zinc to watersheds from building materials, consumer products, tires, and other sources. Reviewed published emission inventories and searched for/reviewed published scientific literature on the release of zinc from various sources. A state-of-knowledge report was prepared and shared with various stakeholders concerned with the release of zinc to surface waters.

Managed projects to assess the acute and chronic aquatic toxicity of tire and road-wear particles (TRWP) to freshwater organisms using standard OECD testing procedures and incorporating sediment elutriate and whole-sediment test designs.

Directed the assessment of three rubber chemicals' fate and transport from TRWP to the environment. Performed a mass balance to characterize the presence of the chemicals in the tread rubber matrix and their subsequent transformation and/or release to various environmental compartments.

Managed the development of a chemicals marker to quantify TRWP in environmental matrices. This work expanded earlier research on the use of tread polymer dimers produced during pyrolysis. A formal method, including the novel use of a deuterated internal standard, was published as an ISO Technical Specification.

Directed and managed the design and execution of soil and freshwater sediment sampling programs to quantify TRWP in the environment. These programs were carried out using a watershed approach in three locations: the Seine River watershed in France, the Chesapeake Bay watershed in the United States, and the Yodo River watershed in Japan.

Provided senior technical review of an integrated microplastic (MP) fate-and-transport model for terrestrially released microplastics. The model linked spatially distributed MP releases with terrestrial and freshwater transport processes, to provide a better understanding of the factors affecting MP distribution to the sea. The model was applied to TRWP to understand the overall amount TRWP released on the road, which could be transported to an estuary.

Provided expert opinion on the proper handling and disposal of paint overspray filters in a case involving spontaneous combustion that resulted in a fire at an injection molding facility. Reviewed case materials such as fire department incident reports, deposition testimony, and material safety data sheets, as well as pertinent federal and state regulations regarding flammable substances and hazardous waste.

Provided third-party review to Nevada Department of Environmental Protection (NVDEP) of ambient air monitoring plans prepared in support of remedial actions conducted in the state.

Managed and served as technical lead in the preparation of a SARA 313 delisting petition for chromite ore. This project involved novel chemical experiments to determine the potential for chromic oxide in the ore to oxidize to the hexavalent valence state under various environmental conditions. This information was used to demonstrate the low toxicity of trivalent chromium to humans and its relative immobility in the environment. These factors, coupled with the low potential for ecological health concerns, confirmed that chromite ore did not meet the criteria for listing a chemical on the SARA 313 list of hazardous chemicals.

Conducted a screening level risk assessment of a paper mill in central Pennsylvania as part of a Phase II site investigation associated with a property transfer. Site contaminants included primarily metals (Al, Mn, As, Pb, Se, Ni) and some VOCs.

Managed and directed the preparation of a hazardous waste delisting petition for K006 waste. This project was conducted on behalf of a chromium chemicals manufacturer in an effort to delist a waste stream currently classified as a listed hazardous waste under RCRA. Tasks involved preparation of a waste-stream sampling plan, including a QA/QC plan for collection of representative samples, validation of the analytical laboratory results, preparation of the delisting petition, and attendance at numerous meetings with the EPA regarding delisting criteria.

Performed more than 50 environmental liability assessments of various industrial and commercial properties as part of due diligence efforts. The assessments have focused on the ASTM Standard, which includes a historical review of the property and its uses, and an assessment of current conditions with respect to environmental releases to air, land, surface water, and groundwater. Additionally, issues with respect to water resources and wetland habitats were evaluated.



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**INDUSTRY TRADE PUBLICATIONS**

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Kreider ML, Burns AM, DeRose GH, **Panko JM**. 2013. Protecting workers from risks associated with nanomaterials: Part I – Exposure assessment. *Occup Health Safety* 82(7):90–94.

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**Panko JM**, Kreider ML, Unice KM. 2013. Industry analyzes global impact of tires. *Rubber Plast News*, June 3:15–18.

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**ABSTRACTS AND PRESENTATIONS**

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Bare J, Vivanco, S, **Panko J**. Example framework for chemical additive replacement prioritization in a circular economy for plastics: Human health perspective. Poster at Society of Environmental Toxicology and Chemistry (SETAC), Philadelphia, PA, November 2022.

**Panko, J**. Challenges in characterizing environmental health risk of microplastics: Experiences from the tire industry project related to tire and road wear particles. Presentation at workshop: Tackling the Potential Human Health Impacts of Microplastics and Nanoplastics: Challenges for Toxicologists in the Assessment of Real-World Complex Mixtures. Society of Toxicology Annual Meeting, Virtual Meeting, March 2021.

Insley AL, Maskrey JR, Hallett LA, Reid RCD, Hynds ES, Winter C, **Panko JM**. Occupational survey of airborne metal exposures to welders, metalworkers, and bystanders in small fabrication shops. Poster at American Industrial Hygiene Conference and Exhibition, Minneapolis, MN, May 2019.

Kreider ML, Hynds ES, **Panko JM**. Evaluation of tire and road wear particles (TRWP) in air in Delhi, India. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.

Benson SM, Maskrey JR, Nembhard M, **Panko JM**. Characterization of surgical smoke generated from electrocautery instruments: A pilot study. Poster at the 2018 American Occupational Health Conference (AOHC) 103rd Annual Meeting, New Orleans, LA, April 29 – May 2018.

Gloekler L, Shay EC, Schmidt N, Haghighat B, **Panko JM**, Cowan DM, Paustenbach DJ. Flame-retardants in upholstered furnishings: An assessment of health risk and fire-related deaths in the era of California Technical Bulletin (TB-117). Abstract #2669. Poster at Society of Toxicology Annual Meeting, New Orleans, LA, March 2016.

Kreider ML, **Panko JM**. Weight of evidence evaluation of potential endocrine disruption by 1,3-diphenylguanidine based on results of tier 1 endocrine disruption screening program assays. Abstract #1864. Poster at Society of Toxicology Annual Meeting, New Orleans, LA, March 2016.

**Panko JM**, Benson SM, Kreider ML. Meta-analysis of lung cancer risk related to diesel exposure by occupation and evaluation of exposure response. Abstract #2976. Poster at Society of Toxicology Annual Meeting, New Orleans, LA, March 2016.

Unice KM, Bare JL, Kreider ML, **Panko JM**. Evaluation of leachate from tire and road wear particles (TRWP) upflow percolation column tests. Poster at Society of Environmental Toxicology and Chemistry, 36th Annual Meeting, Salt Lake City, UT, November 2015.

**Panko JM**, Hitchcock KM. From critical reviews of hazard assessment tools to building a product evaluation framework: Can we bridge the gaps with a super tool? Presentation at the American Industrial Hygiene Conference & Expo (AIHce), Salt Lake City, UT, May–June 2015.

**Panko JM**, Hitchcock KM, Fung M, Spencer PJ, Kingsbury T, Mason AM. A comparative evaluation of seven hazard screening tools. Poster at 25th Annual Meeting of NorCal SETAC, Sacramento, CA, April 2015.

Mason AM, Spencer PJ, **Panko JM**. A pilot project reveals prominent hazard screening tools fall short on performance expectations. Poster at the 54th Annual Meeting and Society of Toxicology (SOT) Meeting, San Diego, CA, March 2015.

**Panko JM**. Chemical selection tools analysis project & results. Presented at GlobalChem. Global Chemical Regulations Conference, Baltimore, MD, March 2014.

Cyrs WD, Tosiano MA, **Panko JM**, Kreider ML. Use of a novel method to assess exposure to nanoscale carbon black and amorphous silica at two tire manufacturing facilities. Presentation at The American Industrial Hygiene Conference & Exposition (AIHce), San Antonio, TX, May–June 2014.

Kreider ML, Cyrs WD, Tosiano MA, **Panko JM**. Method development for nanomaterials exposure assessment in mixed dust environments. Presentation at The American Industrial Hygiene Conference & Exposition (AIHce), San Antonio, TX, May–June 2014.

**Panko JM**. Green chemistry: A critical element of sustainable development and product stewardship. Presentation at The American Industrial Hygiene Conference & Exposition (AIHce), San Antonio, TX, May–June 2014.

Shay EC, **Panko JM**. Community-focused remediation and risk assessment at a former manufactured gas plant site. Poster at Society of Environmental Toxicology and Chemistry, 34th Annual Meeting, Nashville, TN, November 2013.

Hitchcock KM, Shay ED, **Panko JM**. Making product and chemical safety decisions from varying stakeholder viewpoints. Poster platform presentation at Society of Environmental Toxicology and Chemistry, 34th Annual Meeting, Nashville, TN, November 2013.

Tosiano MA, **Panko JM**, Scott PK. Risk based evaluation of the chemical constituents in hydraulic fracturing fluid using the chemical disclosure registry FracFocus. Poster at Society of Environmental Toxicology and Chemistry, 34th Annual Meeting, Nashville, TN, November 2013.

Gauthier AM, Kingsbury T, Ferracini TV, **Panko JM**. Beyond the standards: Comparing sustainability reports of consumer products companies. Session: Stewardship & Sustainability. Poster at The American Industrial Hygiene Conference & Exposition (AIHce) in Montreal, Quebec, May 2013.

Kingsbury T, Gauthier AM, Ferracini TV, **Panko JM**, Perez AL. Predicting chemistries targeted for deselection: A case study with triclosan. Session: Stewardship & Sustainability. Poster at The American Industrial Hygiene Conference & Exposition (AIHce) in Montreal, Quebec, May 2013.

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**Panko JM**, Kreider NK, Unice KM. Tire industry project — An industry-wide product sustainability initiative. Session: Stewardship & Sustainability, Presentation at The American Industrial Hygiene Conference & Exposition (AIHce) in Montreal, Quebec, May 2013.

Kreider ML, Unice KM, **Panko JM**. Framework for quantitative exposure assessment of nanostructured materials in occupational settings. Presented at the TechConnect World 2013 — Nanotech, Microtech, Biotech, Cleantech Joint 2013 Conferences, Washington, DC, May 2013.

Hitchcock KM, **Panko JM**, Scott PK, Unice KM, Shay EC. Responding to community concerns surrounding hydraulic fracturing activities near a school. SETAC North America 33rd Annual Meeting, Long Beach, CA, November 2012.

Kreider ML, Unice KM, **Panko JM**. A case study in understanding exposure associated with nanostructured materials: Carbon black and amorphous silica. Presented at SETAC Asia/Pacific 2012 Meeting, Kumamoto, Japan, September 2012.

Unice KM, **Panko JM**. Analytical method development and validation of a pyrolysis-GC/MS method to quantify tire and road wear particles in environmental samples. Presented at SETAC Asia/Pacific 2012 Meeting, Kumamoto, Japan, September 2012.

Unice KM, Chu J, **Panko JM**. Evaluation of tire and road wear particles in the Yodo River watershed: A global tire industry sustainability initiative. Presented at SETAC Asia/Pacific 2012 Meeting, Kumamoto, Japan, September 2012.

Kreider ML, **Panko JM**. Effects of subacute inhalation exposure to tire and road wear particles in rats. Presented at Eurotox 2012, Stockholm, Sweden, June 2012.

Unice KM, Chu J, McAtee BL, **Panko JM**. Evaluation of tire and road wear particles in the Seine River watershed: A sustainability initiative of the global tire industry. Presented at the 6th SETAC World Congress and 22nd Annual SETAC Europe Meeting, Berlin, Germany, May 2012.

Hitchcock K, Scott PK, Unice KM, **Panko JM**. Comparing the chemical footprint of hydraulic fracturing fluids used in natural gas extraction. Presented at the 6th SETAC World Congress and 22nd Annual SETAC Europe Meeting, Berlin, Germany, May 2012.

Kreider ML, **Panko JM**, Finley BL. 2012. Effects of subacute inhalation exposure to tire and road wear particles in rats. Presented at the 2012 Health Effects Institute (HEI) Annual Conference, Chicago, IL, April 2012.

**Panko JM**. Ambient air quality associated with hydraulic fracturing operations. Presented at the 21st Annual Business and Industry's Sustainability and Environmental Health & Safety Symposium, Cincinnati, OH, March 2012.

**Panko JM**, Zöller M, Tartaglino U, Peters F, Unice KM, Kreider ML, Crawford M. Tire and road wear particles: A comprehensive evaluation of environmental health issue. Tire Technology Expo, Cologne, Germany. February 2012.

**Panko JM**. Evaluation of the potential aquatic toxicity of TRWP to algae, daphnids and fish. Tire Technology Expo, Cologne, Germany, February 2012.

Hitchcock KM, **Panko JM**, Scott PK. The chemical footprint: An emerging indicator of environmental performance. Society for Environmental Toxicology and Chemistry, Boston, MA, November 2011.

Grespin ME, Le MH, **Panko JM**. Safety data sheet alteration during alignment with the Globally Harmonized System of Classification (GHS) and implications for chemical manufacturers, suppliers and distributors. Society for Risk Analysis Annual Meeting, Charleston, SC, December 2011.

Kreider ML, **Panko JM**, McDonald JD, McAtee BL, Finley BL, Seagrave J. Effects of intratracheal instillation of tire and road wear particles (TRWP) and tread particles (TP) on inflammation and cytotoxicity in rat lung: A comparative toxicity study. Society of Toxicology Annual Meeting, Baltimore, MD, March 2011.

**Panko JM**, Kreider ML, Ferrara J. REACH – A review of the regulation and technical components of registration. AIHA Pittsburgh Section, Pittsburgh, PA, February 2010.

Harada M, Shibata T, **Panko JM**, Unice KM. Analysis methodology of rubber fraction in fine particles. ACS Rubber Division 176th Technical Meeting, Pittsburgh, PA, October 2009.

Unice KM, Kreider ML, McAtee BL, **Panko JM**. Evaluation of extractable organic zinc as a quantitative marker for tire tread particles in environmental matrices. ACS Rubber Division 176th Technical Meeting, Pittsburgh, PA, October 2009.

**Panko JM**, Gaffney SH, Kreider ML, Unice KM, Burns AM, Paustenbach DJ, Booher LE, Gelatt RH. Job and task based analysis of benzene air concentrations associated with refinery operations. Benzene 2009: Health Effects and Mechanisms of Bone Marrow Toxicity; Implications for t-AML and the Mode of Action Framework, Munich, Germany, September 2009.

McAtee BL, Kreider ML, **Panko JM**, Sweet LI, Finley BL. Biological leaching of metals from respirable tire wear particles. Eurotox 2009, Dresden, Germany, September 2009.

**Panko JM**, McAtee BL, Kreider ML, Gustafsson M, Blomqvist G, Gudmundsson A, Sweet LI, Finley BL. Physio-chemical analysis of airborne tire wear particles. Eurotox 2009, Dresden, Germany, September 2009.

Widner TE, Paustenbach DJ, Gaffney SH, **Panko JM**, Unice KM, Burns AM, Kreider ML, Gelatt R, Booher L. Airborne benzene concentrations associated with dock operations at the ExxonMobil Refinery, Baytown, Texas (1978–2007). Presentation #243, American Industrial Hygiene Conference and Exhibition, Toronto, ON, June 2009.

**Panko JM**. Progress on a BEEL Guide for d-limonene. Roundtable #224, American Industrial Hygiene Conference and Exhibition, Toronto, ON, June 2009.

**Panko JM**. Case studies in sustainable packaging. Session: What's in Your Package? Sustainable Packaging Coalition Conference, Chicago, IL, March 2009.

Gaffney SH, Kreider ML, Unice KM, Burns AM, Paustenbach DJ, Booher LE, Gelatt RH, **Panko JM**. Benzene exposure in refinery workers (1976–2006). Abstract #864, International Society for Environmental Epidemiology & International Society of Exposure Analysis 2008 Joint Annual Conference, Pasadena, CA, October 2008.

**Panko JM**, Kreider ML, Sweet LI, McAtee BL, Finley BL. Methods for collecting tire wear particles. Paper #40, Fall 174th Technical Meeting of the Rubber Division of the American Chemical Society, Louisville, KY, October 2008.

Kreider ML, McAtee BL, Sweet LI, **Panko JM**, Finley BL. Physical and chemical characterization of tire-related particles: Comparison of particles generated using different methodologies. Paper #41, Fall 174th Technical Meeting of the Rubber Division of the American Chemical Society, Louisville, KY, October 2008.

**Panko JM**, Gaffney SH, Unice KM, Kreider ML, Burns AM, Widner TE, Booher LE, Gelatt GL, Paustenbach DJ. Benzene exposures of refinery workers: Baytown, TX (1978–2006). American Industrial Hygiene Conference and Exhibition, June 2008.

**Panko JM**, Unice KM, Shay EC. 2007. Recommendations for developing child-focused exposure assessments based on VCCEP experiences. Society for Risk Analysis, December 2007.

Williams PRD, **Panko JM**, Unice KM, Brown JL, Paustenbach DJ. 2007. Benzene exposures from petroleum-derived solvents containing trace levels of benzene in occupational settings. American Industrial Hygiene Conference and Exhibition, June 2007.

Gaffney SH, Widner TE, Paustenbach DJ, **Panko JM**, Brown JL, Unice KM. Historical benzene exposure reconstruction: Refinery workers at ExxonMobil Refinery, Baton Rouge, Louisiana (1978–2005). American Industrial Hygiene Conference and Exhibition, June 2007.

**Panko JM**, Unice KM, Shay EC, Javier AF. Assessment of children's exposures to toluene. Society of Toxicology Conference, March 2007.

**Panko JM**, Unice KM, Shay EC, Javier AF. 2006. Assessment of children's exposures to benzene. Society for Risk Analysis, December 2006.

**Panko JM**, Unice KM, Shay EC, Price P. Assessment of children's exposures to xylenes. International Society for Exposure Assessment Conference 2006.

**Panko JM**, Shay EC. Potential for airborne dispersion of bromadiolone and exposure in an office setting. International Society for Exposure Assessment Conference 2006.

Paustenbach DJ, **Panko JM**, Scott PK, Unice KM. Retrospective modeling of potential residential exposure to perfluorooctanoic acid (PFOA) releases from a manufacturing facility. Society of Toxicology Conference 2006.

Paustenbach DJ, Gaffney SA, Scott PK, Brown JL, **Panko JM**. High background levels of urinary benzene metabolites found in volunteer study. Society of Toxicology Conference 2006.

**Panko JM**, Unice KM, Brown JL. Comparison of toluene exposures during spray painting using various consumer product exposure models. International Society for Exposure Assessment Conference 2005.

Unice KM, **Panko JM**, Scott PK. Development of exposure assessment models for indoor air exposure to elemental mercury. International Society for Exposure Assessment Conference 2005.

Unice KM, **Panko JM**, Scott PK. Considerations for reconstruction of TCE exposure from groundwater vapor intrusion. International Society for Exposure Assessment Conference 2005.

Scott PK, Unice KM, **Panko JM**. Statistical evaluation of metals concentrations as a method for identifying World Trade Center dust. International Society for Exposure Assessment 2005.

**Panko JM**, Unice KM, Shay EC, Price P. 2004. Childhood exposure assessment of acetone. International Society for Exposure Assessment 2004.

**Panko JM**, Shay EC, Unice KM. Risk perception: The reoccupancy of Lower Manhattan office space following the national tragedies of September 11, 2001. Poster at the Society for Risk Analysis Annual Conference, December 2003.

**Panko JM**. AWMA/Healthy Indoor Partnerships. International Conference on Indoor Air Quality/Health Indoor Environment, Mold Contamination Case Studies, 2003.

**Panko JM**. Mold problems in buildings. Solving water intrusion and mold problems in Pennsylvania. Lorman Education Services, Altoona, PA, November 2003.

## PEER-REVIEWED REPORTS

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ACC (American Chemistry Council). 2006. Toluene VCCEP submission. Prepared by the American Chemistry Council, Benzene, Toluene, Xylenes VCCEP Consortium, September. Available at <http://www.tera.org/Peer/VCCEP/Toluene/TolueneWelcome.html>

ACC (American Chemistry Council). 2006. Benzene VCCEP submission. Prepared by the American Chemistry Council Benzene, Toluene, Xylenes VCCEP Consortium, March. Available at <http://www.tera.org/Peer/VCCEP/Benzene/BenzeneWelcome.html>

ACC (American Chemistry Council). 2005. Xylenes Category VCCEP Submission. Prepared by the American Chemistry Council Benzene, Toluene, Xylenes VCCEP Consortium, October. Available at <http://www.tera.org/Peer/VCCEP/xylenes/xylenesWelcome.html>

ACC (American Chemistry Council) 2003. Acetone VCCEP submission. Prepared by the American Chemistry Council Acetone Panel, September 10. Available at <http://www.tera.org/Peer/VCCEP/Acetone/AcetoneWelcome.html>



# Camarie Skarovsky Perry, M.S.

SENIOR SCIENTIST II

## CONTACT INFORMATION

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## PROFESSIONAL PROFILE

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Camarie Perry is trained in toxicology and human health risk assessment and has more than 25 years of experience. Her specific areas of expertise include human health toxicology; complex human health risk assessment; assembly, analysis, and summary of toxicological information; development of toxicity factors; remediation, including cleanup-level calculation and development; risk/hazard calculations, and homeland security issues related to toxicology and health effects. She has extensive experience with state and federal remediation sites and analysis of sampling data. Ms. Perry has summarized complex human and animal toxicity information, written scientific papers, and contributed to the development of rapid risk assessment tools for various chemical and biological agents.

Ms. Perry has experience in site evaluation and cleanup under EPA and various state criteria. Her expertise also extends to occupational safety evaluations, as well as food, consumer product, and cosmetic safety assessments. Specifically, she has conducted cosmetic ingredient safety assessments and evaluations, GRAS determinations of food ingredients for human food and animal feed, and evaluations of various chemicals in products. She has completed toxicological and exposure evaluations of various chemicals, including benzene, TCE, hexavalent chromium, manganese, lead, mercury, PCBs, and PFAS. In addition to her technical expertise, Ms. Perry also has served as a project manager.

## EDUCATION AND DEGREES EARNED

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- 1995 Master of Science in Toxicology and Pharmacology  
College of Pharmacy, University of Texas at Austin
- 1992 Bachelor of Science (*cum laude*) in Genetics  
Texas A&M University, College Station

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**PROFESSIONAL ASSOCIATIONS**

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Society of Toxicology (SOT)

- Specialty Sections:
  - Risk Assessment
  - Exposure
  - Regulatory and Safety Evaluation

Society for Risk Analysis (SRA)

- Specialty Sections:
  - Decision Analysis and Risk
  - Exposure Assessment
  - Foundational Issues in Risk Analysis
  - Occupational Health & Safety

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**SCIENTIFIC ADVISORY PANELS, COMMITTEES, & WORKGROUPS**

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Served on SOT placement committee

Served as chair for Regulatory Policy and Decision-Making session at December 2004 SRA meeting

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**PROJECT EXPERIENCE**

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***Toxicology***

Critically evaluated and summarized data from multiple toxicity studies involving 1,4-dioxane, boron, copper, hexavalent chromium, nickel subsulfide, nickel sulfide, nickel acetate, and nickel carbonate. Researched toxicological information for polychlorinated biphenyls (PCBs), dioxins/furans, manganese, selected volatile organic compounds (VOCs), and sulfolane, to write and contribute to several white papers and risk evaluations. Evaluated acute and chronic inhalation toxicity information and occupational standards for air toxics measured in a large urban/industrial area.

Provided extensive toxicological support to U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA) National Homeland Security Research Center (NHSRC) for various projects and tasks, including documents addressing health-protective chemical levels for building re-entry following a chemical disaster (provisional advisory levels [PALs]) and assessment of cumulative risk, as well as development of acceptable acute/short-term and chronic/subchronic chemical levels in water following a hypothetical attack on public water supplies. Examples of specific work include research and analysis of primary and secondary toxic effects data, health standards, and acute exposure guideline levels (AEGLs) for chemicals; methods development; derivation and justification of health-protective values; extensive document writing, review, and incorporation of comments from EPA; research of effect-specific toxicity factors and relative severity of effect; discussion of degradation products and half-lives of various organic compounds; and preparation of health-effects graphics for presentation. Critically reviewed several documents produced by other entities, including an inhalation testing protocol and draft standard operating procedures for PAL development, and prepared technical information for peer review.

For several related litigation cases, researched medical records, disease rates, causes of certain conditions, toxicological interactions of various chemicals and pharmaceuticals, and disease etiology and links, as well as biomarker information for litigation cases. Assembled detailed slides and figures, including those describing medical histories and proposed disease etiologies, for presentations in support of these cases. Extensively researched available approaches for determining arsenic cleanup levels on indoor surfaces and performed multiple calculations reflecting the various approaches. Researched potential bovine toxicity related to chemicals present in livestock drinking water.

Assembled relevant animal and human toxicological data into toxicity profile summaries of various chemicals for Health Canada. Critically evaluated and developed detailed summaries of acute, subchronic, and chronic cancer and noncancer toxicity data from various human health exposure routes, considering toxicokinetics, mode-of-action data, and relevance of particular animal data to humans.

### ***Cosmetics, Consumer Products, and Food Safety Evaluations***

Critically evaluated benzene in consumer products, including its toxicity and background concentrations, as well as regulatory guidance levels and their basis.

Performed safety assessments for multiple cosmetic ingredients. Wrote reports discussing current uses and typical concentrations, and potential concerns such as sensitization, absorption, and toxicity. Assessed safety using the proposed concentration and a margin-of-safety approach.

For multiple ingredients in human and pet food, researched safety and toxicity information for Generally Recognized as Safe (GRAS) assessments, evaluated current use levels, and distilled available toxicity data for various forms of the ingredients.

### ***Risk and Exposure Assessment***

Coordinated human health risk assessment for multi-year Superfund project. Performed complex risk/hazard calculations and prepared EPA Risk Assessment Guidance for Superfund (RAGS) Part D tables to evaluate exposures from multiple contaminants in fish, crab, sediment, and surface water. Primary chemicals of concern included dioxins, furans, PCBs, PAHs, and methyl mercury. Project involved a deterministic risk assessment and a probabilistic risk assessment.

Evaluated potential human health hazard associated with trace levels of PFAS in fluorinated containers for downstream users' conditions of use. Performed exposure-based modeling to evaluate fate and transport and estimated hazard for various human exposure scenarios.

Human health lead for third-party review of human health and ecological risk assessments and related documents for a regulatory agency. Coordinated and reviewed documents for six related sites; subject matter included toxicity information, absorption, screening levels, conceptual site models, lines of evidence, and risk assessments.

Conducted a complex risk assessment for dioxins and furans at a site in Canada; the project involved both deterministic and probabilistic risk assessments. Along with the team, researched toxicity information, exposure factor options and distributions, background concentrations, and congener-specific considerations.

Participated in assessment of workers' exposure to lead in a semi-conductor fabrication facility. Focused on dermal exposure and incidental ingestion. The project included collection of nearly 300 surface wipe samples, calculation of daily lead intake via skin contact and ingestion, evaluation of 14 different worker groups, and blood lead modeling using EPA's adult lead model.

Evaluated measured air concentrations in the Barnett Shale, an area of intensive natural gas exploration; aided in developing appropriate hierarchy of regulatory sources for multiple time frames of exposure.

Performed extensive calculations of concentrations of multiple air toxics monitored over several years in a large urban/industrial area. Compared concentrations to applicable toxicity factors, and critically evaluated the results, considering predominant wind directions, bases for toxicity and occupational values, and margin of exposure. Researched available tap water and groundwater levels for sulfolane. Assembled white paper discussing novel sulfolane toxicity factors derived by ToxStrategies and determined screening levels in tap water for sulfolane. Summarized toxicological and exposure information for several VOCs in groundwater, and derived screening levels protective of various uses, including vegetable garden irrigation.

Calculated screening levels in steel slag for various metals, considering multiple exposure pathways and human receptors. Coordinated and wrote portions of an extensive risk assessment report documenting findings, including a refined probabilistic risk assessment. Developed protective concentration levels (PCLs) based on the Texas Commission on Environmental Quality (TCEQ) Texas Risk Reduction Program (TRRP) rule for comparison with measured concentrations of chemicals in compost derived from sewage sludge. Reviewed TCEQ's compost and sludge rules for applicability.

Developed a complex, integrated Excel model that calculates remediation goals (RGs) for almost 600 chemicals of concern (COCs) for the State of Nebraska Voluntary Cleanup Program (VCP). The model calculates RGs for contaminants in soil and groundwater, considering multiple exposure pathways and both residential and industrial land use. Based on discussions with and comments from the State of Nebraska, patterned the calculations and output after the EPA Region 9 Preliminary Remediation Goals, and added several state-specific approaches and inputs. Wrote text describing the approaches taken for the VCP RGs, assembled a list of contaminants affecting various target organs, applied EPA's toxicity factor hierarchy, wrote a detailed glossary and acronym list, and developed a modified approach for adding the groundwater dermal exposure pathway to the model. Later updated the RG approaches to include current toxicological approaches consistent with EPA's Regional Screening Levels and calculated RGs for the vapor intrusion pathway.

For the State of Kansas Department of Health and Environment, Bureau of Environmental Remediation, developed a detailed, linked Excel model that calculates risk-based concentrations of VOCs in indoor air. Model is accompanied by explanatory text, input parameters, and equations for carcinogens and noncarcinogens. The values and the accompanying text were designed for incorporation into a new section of the Risk-Based Standards for Kansas (RSK) Manual.

Highly involved in the development and implementation of the TCEQ TRRP rule for remediation sites. Wrote rule language, responded to comments, edited portions of the rule, and created and maintained a highly complex, multipathway remediation model. The model calculated Risk-Based Exposure Limits (RBELs) and PCLs for more than 600 COCs in soil, groundwater, and sediment for both residential and commercial/industrial land use. Developed a similar model to calculate Medium-Specific Concentrations (MSCs) for more than 600 COCs under the 1993 Risk Reduction Rule (RRR). Involved in writing and editing the accompanying guidance known as the Consistency Document, and presented TCEQ staff training on this document. Updated PCL/MSC tables with new toxicity data, chemical/physical data, and COCs at least annually for availability on TCEQ's website. Served as the Toxicology & Risk Assessment Section (TARA) contact for answering human health questions from within and outside agency regarding TRRP, RRR, and Consistency Document. Attended meetings with internal and external parties to discuss comments on remediation documents and provided guidance for those developing workplans for submittal to the agency.

Reviewed and approved all comments on risk assessments and TRRP documents from TARA staff prior to internal and external distribution, to ensure accuracy and consistency. Reviewed and distributed comments on risk assessments and TRRP documents for remediation sites and on portions of documents where her expertise could be applied. Trained new toxicologists in remediation reviews and co-reviewed initial documents with them. Wrote and edited TRRP guidance documents and participated in guidance workgroups; wrote TRRP-18 guidance

document addressing risk and hazard levels and cumulative adjustment. Presented instruction on use of TRRP-18 to internal and external audience at TCEQ's Environmental Trade Fair. Served as the TARA contact for receiving requests and calculating human health PCLs/MSCs for additional exposure pathways, as well as COCs not on the TRRP/RRR tables; added 89 COCs in one year. Served as the contact for referrals of risk assessments and TRRP documents to TARA, which involved assigning and tracking the reviews.

Reviewed and analyzed toxicity data, including extensive review for the TCEQ's effect screening levels (ESLs) project. Provided critical review of the Acute Exposure Guideline Levels Technical Support Documents to assess acute health effects of various compounds. Reviewed monitoring data and air permit applications. Reviewed trial/risk burn plans for hazardous waste combustion facilities and overhauled TARA's multipathway combustion risk assessment model.

Calculated complex cleanup levels for a site in Missouri, considering several human health exposure pathways, including dermal contact with groundwater, groundwater volatilization to ambient air, a construction trench, and indoor air, as well as standard soil pathways. Generated EPA RAGS D tables, as well as associated, integrated Excel files to perform the various pathway analyses. Compared the risk-based approaches and exposure factors used in the Risk-Based Corrective Action (RBCA) report to those indicated in various federal and state guidance documents and recommended appropriate parameters for use at the site. Wrote portions of the human health risk assessment (HHRA) text and tables, and responded to comments from EPA, the city, and other interested parties.

Calculated complex risks and hazards for a wide variety of on- and off-site receptors, for both reasonable maximum and central tendency exposure scenarios and a number of human health exposure pathways, for a former metals site in Illinois. Pathways included dermal contact with groundwater, groundwater volatilization to ambient air, a construction trench, indoor air, surface water and sediment, and standard soil pathways. Incorporated current risk assessment approaches, including unique considerations for certain chemicals, including mutagens.

Developed a complex, integrated Excel model for calculating health-protective, site-specific remediation objectives for park properties in Illinois where biosolids may be applied. Developed equations evaluating eight different receptors for seven types of land uses and eight chemicals; considering both carcinogenic and noncarcinogenic effects.

Determined current toxicity factors for chemicals listed in EPA's combustion guidance, consistent with the December 2003 toxicity hierarchy for an Oregon incinerator site. With a colleague, selected and technically reviewed appropriate reference doses (RfDs), oral cancer slope factors (CSFs), inhalation reference concentrations (RfCs), inhalation unit risk factors (URFs), and inhalation CSFs for almost 200 chemicals. Determined acute inhalation exposure criteria (AIEC) in air for the same list of chemicals, consistent with the hierarchy outlined in the site risk assessment work plan. Performed similar toxicity factor selection tasks and wrote descriptive text for a power plant site in Nevada, an explosives site in Missouri, and an incinerator site in Israel.

Critically reviewed the Multipathway Risk Assessment Protocol generated for a federal site in Iowa, according to EPA's 2005 hazardous waste combustion guidance. Provided detailed comments on various issues, including COPC and toxicity factor selection, fate and transport modeling, exposure fact or selection, and evaluation of acute hazards.

Automated, revised, and updated existing human health calculations and output tables to include current COPC concentrations and various exposure pathways for multiple areas of a site in Ohio for soil and groundwater.

Critically reviewed the draft HHRA and risk/hazard calculations for an incinerator site in California, which is proposed to be a future wetland. Primary site COPCs were metals, dioxins, and polycyclic aromatic hydrocarbons (PAHs).

Developed RAGS D tables for various site-specific pathways, including evaluation of indoor air exposures and a construction-worker trench scenario, for a Nebraska site. In addition to toxicity factor selection, risk calculations, and associated analyses, aided in developing the HHRA document and responding to comments from EPA.

Created RAGS D tables and performed risk/hazard and intermediate calculations for contaminants at a site in Nebraska. The site consisted of two exposure units, which were evaluated separately. Receptors evaluated include adult and child residents, commercial/industrial workers, and utility workers. Groundwater exposure pathways relevant to the site included ingestion, inhalation (outdoor and indoor), and a kiddie pool and trench scenario. Wrote portions of the HHRA and remedial investigation (RI) text and summary and revised the RAGS D tables per comments received.

For a site with hexavalent chromium and nickel contamination of soil and groundwater, performed various cleanup-level calculations for several human receptors. Ultimately used a novel toxicity factor for hexavalent chromium, which assumed a non-linear mode of action.

For several Navy sites in California, developed and technically reviewed extensive RAGS D tables for both incremental and total risk at various soil depths for several media and compiled toxicity factors according to EPA's 2003 toxicity factor hierarchy. Recommended and produced documentation for surrogate toxicity factors, analyzed site data, and prepared additional tables and documents related to the site.

Wrote various portions of text, assembled multiple RAGS D tables, and determined risks/hazards for chemicals for various on-site areas, as well as off-site residential areas, for surface and subsurface soil at a Navy site in California. Created complex, interlinked Excel spreadsheets for two residential and two industrial soil depths for each of four different sites within the site. The tables depict soil data statistics, exposure-point concentrations, screening levels, and hazard quotients, as well as carcinogenic risk levels for each of the land uses, soil depths, and individual sites. Performed extensive technical reviews of various data filtering and analyses, RAGS D tables, and performed site-specific analyses of vapor intrusion of COPCs from soil. Reviewed site-specific analyses of vapor intrusion of COPCs from groundwater and used site-specific information to divide a large area of the site into logical exposure units for the vapor intrusion evaluations.

Critically reviewed multiple RAGS D tables for several areas within a Navy site in California for surface and subsurface soil and groundwater impacted by a large suite of chemicals. Reviews entailed complex data set comparisons, verifying selection of chemicals of concern, exposure-point calculations, toxicity value selection (using EPA's 2003 toxicity value hierarchy), toxicity surrogate and target organ selection, detection limit comparisons, statistical calculations, and confirming additional approaches and values within the tables.

For a Navy site in California, derived toxicity factors/cleanup goals where data were lacking, performed temporal data analysis for RAGS D Tables, conducted extensive research for and assembly of toxicity factors considering EPA's December 2003 revised toxicity factor hierarchy for RAGS D tables, and performed streamlined analysis for construction-worker groundwater inhalation risk. Helped develop a method for active soil gas sampling at specific areas and evaluated risks and hazards for indoor air across these locations.

Performed technical reviews for the data analysis and statistics and researched available cleanup goals for explosives detected at a Navy site in California. Performed COPC screening and revised various tables for the HHRA.

For a Navy site in Nevada, reviewed cleanup goals and supporting calculations for a construction worker, data analyses, and risk tables. Provided technical comments on the various approaches and proposed values.

Closely coordinated with a project team in devising sampling plans and an HHRA workplan for a historical mining site in California, evaluating risks/hazards and calculating potential cleanup levels for metals present in soils at the site. Researched and applied various chemical-specific approaches for arsenic, including considerations for relative bioavailability and potential modifications to the cancer slope factor.

For several former manufactured gas plant facilities in Kansas, critically reviewed and provided comments to the Kansas Department of Health and Environment (KDHE) for risk evaluation and feasibility studies for four sites, consisting of on-site and off-site exposures through multiple exposure pathways. Provided toxicity factors/surrogate information for chemicals present at a fifth site. Developed a complex set of Excel calculations to develop Tier 2 risk-based values, using the approach developed by KDHE. Critically evaluated prepared reports for consistency with both state and federal guidance documents and responded to comments from interested parties.

Critically reviewed toxicity profiles discussing toxicity factors, health effects, and absorption information for chemicals of concern at a site in Delaware, including arsenic, methyl tert-butyl ether, chlordane, and various PAHs.

For a former refinery in Illinois, critically reviewed several documents associated with an HHRA and evaluation of the site, including exposure assessment, lead modeling, and calculation of background concentrations.

Developed toxicity profiles for several compounds and various RAGS D tables, which involved selection of toxicity factors according to EPA's 2003 hierarchy for a site in the Texas panhandle. Wrote several portions of the HHRA text and reviewed others.

Developed toxicity profiles for manganese and iron for a site in New Mexico. Researched and discussed the bases for various toxicity factors and cleanup levels for both chemicals.

For a Superfund site in Indiana, technically reviewed the risk assessment, which addressed PCBs in surface water, sediment, and fish tissue.

Wrote portions of the HHRA for a site in Maryland; analyzed soil, groundwater, surface water and sediment data; extensively researched exposure factors; and produced several RAGS D tables.

For a site in Delaware, created various site-specific RAGS D tables for multiple soil and groundwater exposure pathways, for four future site receptors. Also reviewed the toxicity factors selected for the HHRA.

For a contaminated area along a river in New York, developed calculations to determine current and future hazards to three types of receptors for central tendency and reasonable maximum exposure approaches for various exposure pathways, including fish ingestion, surface water, and sediment ingestion and dermal contact. COPCs included PCBs, PAHs, and metals. Developed toxicity factors and wrote much of the HHRA text and tables.

For a combustion site in Washington State, developed calculations to determine risks and hazards from groundwater exposures in a Native American sweat lodge, assuming indoor inhalation and dermal exposures. COPCs included dioxins, uranium, benzo(a)pyrene, Aroclor 1254, and nickel. Technically reviewed responses to comments and calculated media concentrations for various COPCs and complex exposure pathways.

Performed a critical technical review of inputs and calculations for the contaminant volatilization to indoor air exposure pathway, using the Johnson & Ettinger model, for a Navy site in California.

With discovery of a new area of concern at a Superfund site in Texas, wrote risk assessment language to address risks and hazards, derived human toxicity factors based on recent toxicological literature, compiled RAGS D tables, and performed data and site-specific exposure pathway analyses.

For a Superfund site in Texas, wrote the HHRA for off-site areas, where lead was the main chemical of concern. Performed extensive data analysis and presentation, assembly of RAGS D tables, consideration of receptors and exposure pathways; and coordination and integration of figures and subanalyses needed for the risk assessment report.

Reviewed and provided comments relevant to technical comments on a spill investigation report for a refinery in Montana. The evaluation centered on total petroleum hydrocarbon (TPH) chemical analyses and subsequent cleanup goal comparisons.

For a metals facility in Nevada, researched and wrote a brief document describing correlations between radon-222 and radium-226/-228 in groundwater. Studied the relative concentrations of each radionuclide in groundwater at the site and presented observations gleaned from peer-reviewed literature on groundwater studies of the three contaminants, including hydrogeological and geological data, relative toxicity, fate and transport issues, and natural background concentrations.

### ***Environmental Justice***

On behalf of the American Petroleum Institute (API), evaluated methods for cumulative impact assessment (CIA). The project objective was to provide an understanding of existing cumulative impact methods and identify strengths, limitations, commonalities, and differences. With the team, produced a detailed review of research publications and publicly available regulatory information, creating a repository of documentation for these information sources, with a summary of the information provided. The final report also discussed case studies in which CIA methods were used to support policies and decisions regarding environmental justice, which provided understanding of fit-for-purpose methods for CIA.

### ***Environmental Assessments/Investigations***

Participated in evaluations and coordinated comprehensive reports for two large-scale environmental audits for companies involved in widespread cleanup activities. Wrote report sections and coordinated documentation of findings from team members.

Conducted Phase I Environmental Site Assessments (ESAs) for several clients and projects. Performed initial Phase I ESAs, updated Phase I ESAs with new information, wrote reports, performed and documented site visits, and researched various environmental issues applicable to Phase I ESAs.

For an environmental insurance company, researched multiple properties and reviewed applicable environmental/site history records to identify and document any past or current environmental issues. Summarized relevant documents, identified data gaps, and presented findings based on these documents.

Critically reviewed the Engineering Evaluation/Cost Analysis (EE/CA) document for a former chemical company site in Virginia, in accordance with EPA guidance, and provided comments on this document. Ensured that the conclusions for the site, as well as the bases for them, were defensible and health protective. Responded to comments generated by the client and reviewed a revised EE/CA document, modified according to previous comments.

### ***Site Remediation***

For a dry cleaner site in Irving, Texas, prepared a Drinking Water Survey Report as part of an Affected Property Assessment Report (APAR) for the TCEQ in accordance with agency guidance. Wrote the document, contacted local water authorities, and researched potential private well locations. Summarized detailed groundwater contamination data and hydrogeological information (e.g., groundwater flow and other site-specific characteristics), and researched local water supplies.



Extensively reviewed existing sampling data regarding investigations of five solid waste management units (SWMUs) at a chemical company in the Texas panhandle. Determined the extent of sampling and investigations that have been conducted at each SWMU and recommended approaches for completing TCEQ APARs for the five SWMUs. Developed detailed APARs for two of the five SWMUs; coordinated with other staff performing APARs for remaining SWMUs.

For a contaminated site in Dallas, reviewed and assembled site-specific information, including former agency reports, data, geological and hydrogeological data, and soil and groundwater contamination data, to write a Response Action Plan (RAP) for the TCEQ. RAP was written according to TCEQ guidance and contained detailed information relevant to the cleanup plan for the site.

Coordinated with the TCEQ in obtaining ESLs for various chemicals as part of an air permit amendment and renewal for a Texas facility. These chemicals did not have ESLs available on the TCEQ's standard ESL list.

Conducted multiple evaluations and produced documents for several sites for Louisiana Department of Environmental Quality's (LDEQ) Risk Evaluation/Corrective Action Program (RECAP) program. Projects specifically involved environmental investigation of facilities with underground storage tanks that were impacted by Hurricane Katrina in 2005. Reviewed and summarized available soil and groundwater data, carried identified chemicals through the tiered RECAP process, and wrote documents and developed forms according to the RECAP process. Made recommendations on the status of these facilities regarding the extent of environmental contamination at each site.

### ***Toxicology Laboratory Research***

Studied the metabolism and acrolein toxicities of the anti-cancer agent, cyclophosphamide (CP), and conducted cell culture experiments with CP and its glutathione metabolites. Assessed relative toxicities of metabolites using the alamarBlue® assay and investigated further metabolism of CP-generated species using high-performance liquid chromatography (HPLC). Presented various seminars and posters at Society of Toxicology (SOT) meetings.

## **PUBLICATIONS**

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Wikoff D, Thompson C, **Perry C**, White M, Borghoff S, Fitzgerald L, Haws LC. 2015. Development of toxicity values and exposure estimates for tetrabromobisphenol A (TBBPA): Application in a margin of exposure assessment. *J Appl Toxicol* 36(11):1292–308.

Bunch AG, **Perry CS**, Abraham L, Wikoff DS, Tachovsky JA, Hixon JG, Urban JD, Harris MA, Haws LC. 2014. Evaluation of impact of shale gas operations in the Barnett Shale region on volatile organic compounds in air and potential human health risks. *Sci Tot Environ* 468–469(2014):832–842.

Thompson CM, Gaylor DW, Tachovsky JA, **Perry C**, Carakostas MC, Haws LC. 2013. Development of a chronic noncancer oral reference dose and drinking water screening level for sulfolane using benchmark dose modeling. *J Appl Toxicol* 33(12):1395–1406.

MacDonell M, Haroun L, Teuschler L, Rice G, Hertzberg R, Butler J, Chang Y, Clark S, Johns A, **Perry C**, Garcia S, Jacobi J, Scofield M. 2013. Cumulative risk assessment toolbox: Methods and approaches for the practitioner. *J Toxicol*, Article ID 310904.

Ramu K, **Perry CS**, Ahmed T, Pakenham G, Kehrer JP. 1996. Studies on the basis for the toxicity of acrolein mercapturates. *Toxicol Appl Pharmacol* 140:487–498.

**Perry CS**, Liu, XL, Lund LG, Kehrer JP. 1995. Differential toxicities of cyclophosphamide and its glutathione metabolites to A549 cells. *Toxicol in Vitro* 9:21–26.

## ABSTRACTS AND PRESENTATIONS

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**Perry C**, Proctor D. Short-term environmental inhalation toxicity criteria for airborne manganese protective of neurological and respiratory effects for use in air toxics risk assessment. Presentation 5-15.t-04 to Society of Environmental Toxicology and Chemistry, Pittsburgh PA, November 2022.

Proctor D, Mittal L, Vivanco S, **Perry C**, Blanchette A. Probabilistic health risk assessment for residential exposures to metals in electric arc furnace (EAF) steel slag. Presentation 5.15.P-Th123 to Society of Environmental Toxicology and Chemistry, Pittsburgh PA, November 2022.

**Perry C**, Verwiel A, Antonijevic T, Vivanco S, Proctor D. Short-term environmental inhalation toxicity criteria for airborne manganese protective of neurological and respiratory effects for use in air toxics risk assessment. Presented at the Society of Environmental Toxicology and Chemistry North America's 43<sup>rd</sup> Annual Meeting, Pittsburgh, PA, November 13–17, 2022.

**Perry C**, Rish W, Ring C, Mittal L, Harris M. Use of probabilistic risk assessment and physiologically based pharmacokinetic modeling in supporting soil remedial objectives for dioxins and furans at a Canadian site. Poster for Society for Risk Analysis, Virtual Annual Meeting, 2020.

Urban JD, Thompson CM, Plunkett LM, **Perry CS**, Haws LC. A state of the science copper reference dose for soil remediation. Presented at the Society of Toxicology's 54th Annual Meeting, San Diego, CA. March 22-26, 2015.

Haws LC, Thompson C, **Perry C**, White M, Fitzgerald L, Borghoff S, Wikoff D. Development of non-cancer based toxicity factors and daily dose estimates for TBBPA. Presented at the Society of Toxicology's 53rd Annual Meeting. Phoenix, AZ. March 23–27, 2014.

Wikoff D, Thompson C, **Perry C**, White M, Fitzgerald L, Borghoff S, Haws LC. Development of an oral cancer slope factor and lifetime average daily dose estimates for TBBPA. Presented at the Society of Toxicology's 53rd Annual Meeting. Phoenix, AZ. March 23–27, 2014.

**Perry C**, Tachovsky JA, Ke M, Urban J, Haws L. Natural gas exploration and production in the Barnett Shale: Assessment of exposures to volatile organic compounds (VOCs). Presented at the Society of Toxicology's 51st Annual Meeting. San Francisco, CA. March 11–15, 2012.

Thompson C, **Perry C**, Gaylor D, Tachovsky A, Burkhalter B, Haws L. Derivation of an oral reference dose and drinking water screening level for sulfolane using benchmark dose modeling. Presented at the 50th Annual Meeting of Society of Toxicology. Washington, D.C. March 6-10, 2011.

Williams CW, **Perry CS**. Risk assessment for arsenic on indoor surfaces. Presented at the Society for Risk Analysis annual meeting. Boston, MA. December 7-10, 2008.

**Perry CS**. Vibrios in surface waters and a hypothetical scenario using EPA's Environmental Consequence Assessment Tool (ECAT). Presented at the Society for Risk Analysis annual meeting. San Antonio, TX. December 9-12, 2007.

Smith JD, **Perry C**, Garcia S, Jenkins A, Dwyer M, Garrahan K. Emergency Consequence Assessment Tool (ECAT) for USEPA NHRSC. Presented at the Society for Risk Analysis annual meeting. San Antonio, TX. December 9-12, 2007.

Dwyer M, **Perry C**, Jenkins A. Trichloroethylene toxicity and risks: Recent developments and potential implications. Presented at Texas Association of Environmental Professionals -- Environmental Challenges and Innovations Conference. February 2007.

Finster M, MacDonell M, Bhattacharyya M, Haroun L, Peterson J, **Perry C**. Environmental fate and cumulative risk context for cleanup programs. Presented at the Society for Risk Analysis' Annual Meeting. Baltimore, MD. December 3-6, 2006.

**Perry CS**, Garcia S, Collie S, MacDonell M, Adeshina F, Sonich-Mullin C. Application of provisional advisory levels for EPA National Homeland Security Research Center's secure, internet-based rapid risk tool. Presented at the Society for Risk Analysis' Annual Meeting. Orlando, FL. December 4-7, 2005.

**Perry CS**, Morton E. Lessons learned from creating integrated Excel models to calculate human health screening values. Presented at the Society for Risk Analysis' Annual Meeting. Palm Springs, CA. December 5-8, 2004.

**Perry CS**. Process for development of protective concentration levels for remediation sites in Texas. Presented at Society for Environmental Toxicology and Chemistry (SETAC) meeting. Austin, TX. November 9-13, 2003.

**Perry CS**. TRRP Rule - The basics part 2: Human health PCLs and look-up tables. TNRCC Environmental Trade Fair. 2002.

**Perry CS**, Post ZL, Rembish SJ. Methods used and general findings of the human health workgroup of the State of Texas Environmental Priorities Project (STEPP). Presented at the Society for Risk Analysis' Annual Meeting. 1996.

**Perry CS**, Post ZL, Rembish SJ. Methods used and general findings of the human health workgroup of the State of Texas Environmental Priorities Project (STEPP). Gulf Coast SOT meeting. 1995.

Ramu K, **Perry CS**, Ahmed T, Pakenham G, Kehrer JP. Mechanisms of acrolein mercapturate toxicity. Presented at the Meeting of Society of Toxicology. 1996.

Sauers L, **Perry C**. Regulatory affairs—A growing opportunity for toxicologists. SOT Communiqué, May/ June 1996.

**Perry CS**, Kehrer JP. Relationship between toxicity of glutathione-acrolein conjugates and thiol status of A549 cells. Meeting of Society of Toxicology. 1995.

**Perry CS**, Liu XL, Lund LG, Kehrer JP. The effect of cyclophosphamide and its metabolites on the growth of cultured A549 cells. Presented at the Gulf Coast SOT meeting. 1993.

**Perry CS**, Liu XL, Lund LG, Kehrer JP. The effect of cyclophosphamide and its metabolites on the growth of cultured A549 cells. Presented at the Meeting of Society of Toxicology. 1994.

Fraiser L, **Skarovsky C**, Kehrer JP. Bioactivation of a glutathione-acrolein conjugate to bladder-toxic species. Presented at the Meeting of Society of Toxicology. 1993.

# Liz Mittal, M.S.

SENIOR ENGINEER I

## CONTACT INFORMATION

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## PROFESSIONAL PROFILE

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Ms. Liz Mittal is a Senior Engineer I in ToxStrategies' Houston, Texas, office. She has more than 10 years of experience in human health risk assessment, environmental modeling, and computational analysis. Ms. Mittal has conducted numerous human health risk assessments (e.g., Superfund, consumer, occupational, and radiological), evaluating risk from various exposure pathways, both deterministically and probabilistically. She has managed and statistically analyzed extensive environmental and industrial hygiene data sets. She has developed indoor air models to assess risks from household consumer products, and she is also experienced in AERMOD dispersion modeling to predict ambient air concentrations resulting from releases to air. Ms. Mittal's expertise also includes conducting dose-response modeling to derive points of departure. She has used geographic information system (GIS) software to support quantitative assessments. Prior to her work in environmental engineering, she was a practicing chemical engineer in the semiconductor industry, designing and fabricating devices, and optimizing key manufacturing processes.

Ms. Mittal holds a master's degree from the University of Texas at Austin, in Environmental and Water Resources Engineering. Her graduate research focused on innovative approaches to characterizing and monitoring exposure to sediment contaminants during remediation. She has conducted field studies using passive sampling techniques to evaluate the effectiveness of remedy caps at Superfund sites. She has also conducted laboratory investigations to quantify the sorption of contaminants onto various amendments for capping remedies.

## EDUCATION AND DEGREES EARNED

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| 2010 | M.S. in Environmental and Water Resources Engineering<br>University of Texas at Austin |
| 2003 | B.S. in Chemical Engineering<br>Texas A&M University, 2003                             |

## SELECTED PROFESSIONAL EXPERIENCE

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### ***Human Health Risk Assessments***

Conducted a human health risk assessment to establish remediation goals for dioxins and furans in soil for a former wood treating site in Canada that is to be repurposed to an urban residential development. Performed the 1-D probabilistic risk assessment using Oracle® Crystal Ball.

Determined maximum allowable concentrations for PFAS in containers—levels that are protective of consumer exposures. Considered acceptable margin-of-exposure (MOE) for residential application and post-application exposures, and also predicted various environmental media concentrations.

Compiled and statistically analyzed an extensive data set of workplace monitoring data from multiple companies in support of a TSCA risk evaluation. Conducted the analysis in R and incorporated Kaplan-Meier statistics, as well as conventional imputation techniques.

Conducted a spatial risk assessment of a 300-acre federal complex that used to manufacture airplanes and non-nuclear components for nuclear weapons. The project included managing and analyzing numerous environmental data sets from the 1980s through the present. Calculated carcinogenic risks and non-cancer hazard quotients for potential chemicals of concern for various receptors (e.g., outdoor, construction, and trench utility workers), and used ArcGIS to identify and graphically present areas of concern for remediation or risk management strategies.

Performed a human health risk assessment for recreational exposure to Lower Passaic River mudflat sediments containing a variety of contaminants such as PCDD/Fs, PCBs, metals, and other organics. This project involved establishing a screen for identifying the chemicals of concern, as well as reducing the large data set to determine descriptive statistics of exposure-point concentrations. Both deterministic and probabilistic risk assessments were developed to determine risk and hazard from the defined exposure scenarios. Additionally, advanced techniques were employed to quantitatively allocate the risk among potential sources.

Analyzed an extensive ambient air data set on particulate matter (PM) to evaluate whether air quality could adversely affect a residential community in the vicinity of several potential sources. Further, conducted statistical analysis of various wind directions in conjunction with PM data to determine whether the contribution from one potential source was elevated significantly.

Provided QA support for an Assembly Bill 2588 (AB2588) health risk assessment for residents in the vicinity of a metal-forging plant in California. Characterized emission rates from stack-test data and emission factor estimates for several processes at the plant. Linked the results of air dispersion modeling to the integrated risk assessment module HARP (Hotspots Analysis and Reporting Program). Additionally, evaluated the impact of implementing changes to baghouse stack heights.

Derived alternative preliminary remediation goals to be protective of fish and crab ingestion from the Lower Passaic River (LPR). The effort was a collaborative effort among three consulting firms to combine an empirical bioaccumulation model, LPR angler survey-derived ingestion rates, and a probabilistic risk platform. These alternative PRGs were presented as comments on the Focused Feasibility Study issued in 2014 by USEPA Region 2.

Conducted a margin-of-exposure assessment to determine whether the levels of a banned azo-dye detected in a textile could pose a health risk to consumers. This project included a detailed review of toxicity associated with the banned azo-dye. Additionally, derived exposure concentrations based on transfer factors that characterize the migration of the dye via leaching in sweat from the textile to the skin.

Developed a risk assessment platform that incorporated results from an indoor air quality dispersion model and determined inhalation risk for household consumer products. The platform was based on the output of an indoor air mass-balance model that had the ability to incorporate gas-phase reactions and sink depositions. The tool enables users to assess the chronic cancer risk based on product formulations and can be used to determine maximum allowable concentrations in product design.

Derived estimated daily intake (EDI) levels for a new ingredient's Generally Recognized as Safe (GRAS) notification. The EDI assessment involved analyzing National Health and Nutrition Examination Survey (NHANES) dietary data for various food categories and proposed uses with the R statistical program.

### ***Epidemiology***

Used geographic information system (GIS) software to identify census tracts of interest using distance-based methods and geospatial statistics-based methods for use in epidemiological analysis.

Conducted a meta-analysis to understand the impact of selecting alternative risk ratio values from peer-reviewed publications on risks for chromium-exposed cohorts.

Analyzed NHANES survey data to characterize thyroid hormone effects from environmental exposures to goitrogenic chemicals.

Maintained a database of occupational history and reconstructed exposure doses for workers at a chromate production plant operating from the 1940s into the 1970s. This evaluation expanded on a previously published dose-response analysis for this plant by expanding the original cohort to also include short-term workers.

### ***Evaluation of Chemical Characteristics and Toxicity***

Used QSAR to assess ready biodegradability in support of market claims for an extensive database of chemicals. Performed batch testing of ready biodegradability using EPA's EPI Suite BOWIN module, along with an *R*-tool developed in-house to assess applicable domain for the model predictions. Additionally, used OPERA as a secondary tool to provide additional predictions. For a subset of the database, compared predictions to empirical data to assess BOWIN's and OPERA's balanced accuracy and positive predictive value.

Provided QA support in developing an inhalation reference value for titanium dioxide by performing a complete reproduction of multi-path particle dosimetry modeling (MPPD) and dose-response modeling (using EPA's Benchmark Dose Modeling Software, BMDS).

Conducted a physico-chemical property search for an extensive list of chemicals under consideration for the Endocrine Disruptor Screening Program (EDSP), to determine whether chemical properties (e.g., solubility, hydrolysis, photolysis, volatility, etc.) conflict with specific assay testing requirements.

Conducted statistical analysis of an extensive database of toxicity data using various point-of-departure (POD) methods to help develop a standard approach to establishing PODs for genotoxic compounds. The points of departure included no-observed-genotoxic-effects level (NOGEL), bilinear modeling (for evaluating thresholds), and benchmark dose modeling.

Performed dose-response modeling for dioxin and dioxin-like compounds based on a peer-reviewed tiered modeling approach that uses EPA BMDS and GraphPad Prism. This study resulted in revised benchmark doses (BMDs) and half-maximal effective concentrations (EC<sub>50</sub>s), which were then used to calculate relative effect potencies (REPs). The impact of these revised REPs on the WHO<sub>2004</sub> REP database distribution is currently under evaluation.

### **Development of Analytical Methods**

Conducted a field study at the McCormick and Baxter Superfund site to evaluate the effectiveness of the sediment cap remedy. This study used the polydimethylsiloxane (PDMS) profiler, a passive sampling technique, to quantify polyaromatic hydrocarbons in the porewater of the cap, and thereby to characterize chemical migration. The analysis included vertical profiling, statistical determination of areas of concern, and comparison of performance metrics between the PDMS sampler and the traditional analytical method.

Performed an extensive calibration of the PDMS fiber using water collected from the Pacific Sound Resources Superfund site. The study was designed to traverse a wide range of concentrations, to determine site-specific partitioning coefficients for the 16 EPA Priority PAHs for subsequent use in field applications. Additionally, characterized uptake kinetics and the volatilization of PAHs from the fiber.

### **Process Engineering**

Conducted a series of experiments to evaluate a new low-temperature processing technique for contact etch. The study included optimizing gas flows to accommodate the lower temperature condition and the different chamber configuration. This new process was implemented into the manufacturing flow and provided increased throughput and improved flexibility.

Used SixSigma methods and Design of Experiments to identify key parameters contributing to semiconductor manufacturing process issues (i.e., edge-treatment arcing). In doing so, established standard operating procedure for determining process windows used in process control.

Used Fathom FFT to develop a simulation model of the distribution of utilities through the hexamethylene diisocyanate (HDI) unit at a plant in Baytown, Texas. The study involved incorporating actual piping configurations that were inconsistent with design piping and instrumentation diagrams into the Fathom model. Identified bottlenecks and alternative distribution patterns to improve efficiency in utilities usage.

## **COMPUTER & LANGUAGE SKILLS**

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RESRAD-on-site, AERMOD, R statistical language, ProUCL, ArcGIS, EPI Suite, OPERA, AIHA IH SkinPerm, AIHA IHMod, Hotspots Analysis and Reporting Program (HARP), Benchmark Dose Modeling (BMDS), Regional Deposited Dose Ratio (RDDR), Multiple-Path Particle Dosimetry Model (MPPD), RSEI-GM, SEERStat, ConsEXPO, U.S. EPA Tool kit for Indoor Air Quality and Inhalation Exposure Model (IAQX), Oracle Crystal Ball

## **PUBLICATIONS**

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Verwiel A, Racz L, **Mittal L**, Rish W. 2022. CDC's national report on human exposure to environmental chemicals. SETAC Globe 23(6), [https://globe.setac.org/cdc\\_report\\_human\\_exposure\\_to\\_chemicals/](https://globe.setac.org/cdc_report_human_exposure_to_chemicals/).

Suh M, Wikoff D, Lipworth L, Goodman M, Fitch S, **Mittal L**, Ring C, Proctor D. 2019. Hexavalent chromium and stomach cancer: A systematic review and meta-analysis. Crit Rev Toxicol [ePub ahead of print]: doi: 10.1080/10408444.2019.1578730.

Thompson CM, Suh M, **Mittal L**, Wikoff D, Welsh B, Proctor DM. 2016. Development of linear and threshold no significant risk levels for inhalation exposure to titanium dioxide using systematic review and mode of action considerations. Regul Toxicol Pharmacol 80:60–70.

- Suh M, Thompson CM, Brorby GP, **Mittal L**, Proctor DM. 2016. Inhalation cancer risk assessment of cobalt metal. *Regul Toxicol Pharmacol* 79:74–82.
- Thompson CM, Seiter J, Chappell MA, Tappero RV, Proctor DM, Suh M, Wolf JC, Haws LC, Vitale R, **Mittal L**, Kirman CR, Hays SM, Harris MA. 2015. Synchrotron-based imaging of chromium and  $\gamma$ -H2AX immunostaining in the duodenum following repeated exposure to Cr(VI) in drinking water. *Toxicol Sci* 143(1):16–25.
- Proctor DM, Suh M, **Mittal L**, Hirsch S, Salgado RV, Bartlett C, Van Landingham C, Rohr A, Crump K. 2015. Inhalation cancer risk assessment of hexavalent chromium based on updated mortality for Painesville chromate production workers. *J Expo Sci Environ Epidemiol* 26(2):224–231; doi: 10.1038/jes.2015.77.
- Suh M, Thompson C, Kirman C, Carakostas M, Haws LC, Harris M, Proctor D, **Abraham L**, Hixon JG. 2014. High concentrations of hexavalent chromium in drinking water alter iron homeostasis in F344 rats and B6C3F1 mice. *Food Chem Toxicol* doi: 10.1016/j.fct.2014.01.009.
- Suh M, **Abraham L**, Hixon JG, Proctor D. 2014. The effects of perchlorate, nitrate, and thiocyanate on free thyroxine for potentially sensitive subpopulations of the 2001–2002 and 2007–2008 National Health and Nutrition Examination Surveys. *J Expos Sci Epidemiol* 2013:1–9.
- Bunch AG, Perry CS, **Abraham L**, Wikoff DS, Tachovsky JA, Hixon JG, Urban JD, Harris MA, Haws LC. 2014. Evaluation of impact of shale gas operations in the Barnett Shale region on volatile organic compounds in air and potential human health risks. *Sci Tot Environ* 468–469:832–842.
- Thompson CM, Fedorov Y, Brown DD, Suh M, Proctor DM, **Kuriakose L**, Haws LC, Harris MA. 2012. Assessment of Cr(VI)-induced cytotoxicity and genotoxicity using high content analysis. *PLoS ONE* 7(8):e42720.
- Qian YC, Zheng Y, **Abraham L**, Ramos K, Castiglioni E. 2005. Differential profiles of copper-induced ROS generation in human neuroblastoma and astrocytoma cells. *Molec Brain Res* 134(2):323–332.

## PRESENTATIONS

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- Proctor D, **Mittal L**, Vivanco S, Perry C, Blanchette A. Probabilistic health risk assessment for residential exposures to metals in electric arc furnace (EAF) steel slag. Presentation 5.15.P-Th123 to Society of Environmental Toxicology and Chemistry, Pittsburgh PA, November 2022.
- Proctor DM, **Mittal L**, Vivanco S, Antonijevic T. Probabilistic health risk assessment for residential exposures to metals in electric arc furnace (EAF) steel slag. Poster at Society of Environmental Toxicology and Chemistry (SETAC), Philadelphia, PA, November 2022.
- Thompson CM, Chappell GA, **Mittal L**, Gorman B, Proctor DM, Haws LC, Harris MA. Use of targeted mode-of-action research to inform human health risk assessment of hexavalent chromium. Poster presented at Society of Toxicology Annual Meeting, San Diego, CA, March 2022.
- Perry C, Rish W, Ring C, **Mittal L**, Harris M. Use of probabilistic risk assessment and physiologically based pharmacokinetic modeling in supporting soil remedial objectives for dioxins and furans at a Canadian site. Poster for Society for Risk Analysis, Virtual Annual Meeting, 2020.
- Mittal L**, Leber P, Hillwalker W, Kowalczyk A, Panko J. QSAR tools to estimate ready biodegradability of chemicals: Critical evaluation for implementation in market decisions. Platform presentation at Society of Environmental Toxicology and Chemistry, Annual Meeting, November 2020.



Suh M, Harvey S, Wikoff D, **Mittal L**, Ring C, Goodmanson A, Proctor D. Meta-analysis of hexavalent chromium and stomach cancer. Poster presented at Society of Toxicology Annual Meeting, Baltimore, MD, March 2017.

**Abraham L**, Harris MA, Perry CS, Urban JD, Wikoff DS, Kinnell JC, Bingham M, Hickman S. Lower Passaic River RMO-8: An alternative preliminary remediation goal. Presented at the Battelle Sediments Conference, New Orleans, LA, January 2015.

Hixon JG, Thompson C, Bichteler A, **Abraham L**. Smoothing regression splines as the basis for dose-response modeling. Presented at the Society of Toxicology's 53rd Annual Meeting, Phoenix, AZ, March 2014.

Proctor DM, Suh M, Tachovsky JA, **Abraham L**, Hixon JG, Brorby GP, Campleman SL. Cumulative risk assessment of urban air toxics: A pilot study in San Antonio, Texas. Presented at the Society of Toxicology's 53rd Annual Meeting, Phoenix, AZ, March 2014.

Reible DD, **Kuriakose L**, Blischke H, Manzano S. Evaluating sediment cap performance with PDMS profilers: Field study of McCormick and Baxter Superfund site. Battelle Sixth International Conference on Remediation of Contaminated Sediments, New Orleans, LA, February 2011.

Blischke H, Reible DD, **Kuriakose L**, Manzano S. Evaluation of solid phase microextraction for long term sediment cap performance at the McCormick and Baxter Superfund site. SETAC North America 31st Annual Meeting, Portland, OR, November 2010.

# Jennifer Bare, B.S.

ENGINEER III

## CONTACT INFORMATION

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## PROFESSIONAL PROFILE

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Ms. Jennifer Bare is an environmental engineer with 9 years of scientific consulting experience. She specializes in quantitative exposure modeling and reconstruction, human health risk assessment, chemical transport analysis, and data management. She has assessed risks associated with consumer, community, and occupational exposures to a variety of products and chemicals. She focuses on designing and implementing chemical exposure models for volatile and semi-volatile organic compounds, particulates, and metals. Specifically, she has modeled and re-created exposures from inhalation (near-field, far-field, and vapor intrusion), dermal, hand-to-mouth, and ingestion pathways. Additionally, she has experience in deriving chemical toxicity criteria through dose-response modeling, determining exposure and background levels using statistical analyses, and understanding uncertainty and sensitivity using probabilistic modeling (e.g., Monte Carlo).

Ms. Bare has specific expertise in reconstructing and predicting community exposures to industrial emissions using USEPA air dispersion models. She routinely assists clients with products and chemicals that are regulated under California's Proposition 65 and USEPA's Toxic Substances Control Act (TSCA). She also regularly assists with estimating exposures associated with complex contaminated sites and emitters, such as manufactured gas plants (MGPs) and chemical plants.

## EDUCATION AND CERTIFICATIONS

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- 2013 BS, Environmental Engineering, The Ohio State University
- 2013 Engineer Intern (E.I.) Certification, The State of Ohio

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**PROFESSIONAL ACTIVITIES**

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2014—Present     Society for Risk Analysis (SRA)  
2020—Present     International Society of Exposure Science (ISES)  
2021—Present     Society of Environmental Toxicology and Chemistry (SETAC)

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**SELECTED PROFESSIONAL EXPERIENCE**

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***Environmental Fate & Transport Modeling***

Managed a project that involved evaluating the contributions of several sources of particulate matter and hazardous air pollutants surrounding an industrial park. This work included using the AP-42 Emission Factor Chapters to estimate emissions of mobile and non-mobile sources, relying on regulatory management systems of permitted sources, and performing literature searches of general agricultural pollution. The USEPA AirToxScreen and National Emissions Inventory (NEI) were reviewed to identify potential area sources. This work also required synthesizing and summarizing large sets of fence-line meteorological and particulate matter data, to understand temporal and spatial wind and particulate-matter trends. The project culminated in conducting air dispersion modeling to predict site-specific, off-site impacts of particulate matter.

Performed blood lead modeling using IEUBK for a community with varying levels of exposure to lead in soil, dust, ambient air, and drinking water. This work was used to understand the impact to overall risk by route of exposure.

For several residential and commercial/industrial sites, predicted site-specific attenuation factors and indoor air concentrations from vapor intrusion using USEPA's and PA DEP's Johnson and Ettinger models. Predicted air concentrations were used to estimate health risks from vapor intrusion-related exposures. Chemicals of interest included several chlorinated compounds and other volatile organic compounds. Several sites relied on the screening levels provided by the Human and Ecological Risk Office of the California Department of Toxic Substances Control (DTSC HERO), the Regional Water Quality Control Board (RWQCB), and USEPA.

Performed screening air dispersion modeling of a prioritized chemical using USEPA's AERSCREEN in preparation for a USEPA TSCA risk evaluation. Included a comparison to background concentrations and human health benchmarks.

Provided technical support for a Health Risk Assessment (HRA) for a Specific Plan, according to Bay Area Air Quality Management District (BAAQMD) California Environmental Quality Act (CEQA) guidelines. Support included evaluating the HRA approach for assessing health risks from construction and operational activities.

Developed and directed multiple Proposition 65 assessments that evaluated potential community exposures to chemicals emitted from industrial operations. Collected site-specific information and synthesized data for air dispersion modeling using USEPA's screening model AERSCREEN. Estimated exposures for nearby community receptors of concern, refining the model and model assumptions as necessary. Several chemicals assessed did not have State-defined Safe Harbor Levels (SHLs) to serve as the basis for assessing risk, so SHLs were derived or acceptable exposure levels were estimated or identified.

Managed an air dispersion modeling effort to assess odor from multiple turbines at a military facility in the surrounding community. Determined chemicals emitted from turbines using fuel data and compiled corresponding odor thresholds from various USEPA sources.

Estimated occupational and community exposure to asbestos from facilities that historically manufactured or used asbestos-containing materials. Used USEPA's refined air dispersion model, AERMOD, to account for variable

emission rates from multiple area, fugitive, and point sources of asbestos. Airborne asbestos concentrations were predicted for thousands of potential receptor locations.

Estimated potential exposures to volatile organic compounds (VOCs); nitrogen oxides (NOx); and benzene, toluene, ethylbenzene, and xylenes (BTEX) from a natural gas compression facility. Performed air dispersion modeling with AERMOD and conducted an extensive review of site-specific emissions data and regulatory reports. Supported preparation of expert reports using model results to reconstruct exposures and assess effects on human health.

As part of an industry initiative called the Tire Industry Project, participated on a team that evaluated the environmental fate of chemicals formulated in tire and road wear particles (TRWPs). The team analyzed column leaching and sediment incubator study data to evaluate analytical repeatability, quantify the mass of chemical leached, and analyze the environmental fate and transport of TRWP constituents. The team studied TRWP-associated chemicals with various physical characteristics, as well as their changes from weathering.

### ***Exposure and Risk Assessment***

Assisted with a quantitative exposure evaluation of BPA in containers under California's Proposition 65. This assessment included estimating hand-to-mouth and dermal exposures using product testing data.

Developed training materials to assist in chemical exposure and risk assessments of cosmetics. The training materials included an Excel-based tool with a screening-level exposure assessment module and a module that incorporated the results of a higher tier exposure model (i.e., ConsExpo) into automated margin-of-safety calculations. The tool was accompanied by a user guide and presentation.

Reviewed concentration data and exposure assessments of benzophenone in consumer products from published literature and regulatory risk assessments, for the purpose of conducting a cumulative risk assessment. Work involved identifying data gaps and key uncertainties.

Assisted with a tiered risk assessment of consumption of crops that were irrigated with contaminated groundwater. Methods included estimating plant uptake of various organic and inorganic compounds, as well as metals and radionuclides, and retrieving consumption rates from the Food Commodity Intake Database (FCID).

Estimated acceptable concentrations of chemicals in pesticide consumer products using USEPA's Standard Operating Procedures (SOPs) for Residential Pesticide Exposure Assessment. Assessed handler and post-handler exposures for several product uses.

Developed an Excel-based job exposure matrix that recreated cumulative exposures for thousands of employees and job titles.

For several litigious and regulatory sites and exposure scenarios, predicted vapor intrusion exposures to many organic compounds in soil gas and groundwater. Work has included assessing site-specific sub-surface conditions, compiling regulatory screening levels (USEPA, DTSC, RWQCB), estimating chemical-specific attenuation factors, and modeling indoor air concentrations and subsequent risks.

Compiled and evaluated predicted exposure assessments and risk analyses from the USEPA National Air Toxics Assessment (NATA), National Emissions Inventory (NEI), and AirToxScreen for several communities and chemicals in the United States.

Developed an Excel-based margin-of-safety (MOS) tool to assist in cosmetic product safety assessments. This work included a Tier 1 inhalation model, integration of a refined model software (ConsExpo), and implementation of the tool via an external training.

Assisted in implementing a regulatory risk assessment of an industrial emitter under RCRA. Predicted community air concentrations using AERMOD per the approved protocol.

Performed a screening-level community exposure assessment of industrial emissions of ethylene oxide in preparation for regulatory compliance. This assessment included modeling receptor and monitor-specific concentrations in AERMOD and comparing these predicted concentrations to background levels.

Provided assistance to a trade association with stakeholders of a chemical undergoing a TSCA existing-chemical risk evaluation. Projects included a screening-level community exposure assessment of industrial emissions, providing comments to USEPA on the occupational risk evaluation scope, and assisting with industrial hygiene data management.

Reviewed the 1,4-dioxane Draft TSCA Risk Evaluation for a trade association. Commented specifically on USEPA's occupational exposure assessment of the inhalation and dermal pathways. Provided recommendations for future assessments specific to the Monte Carlo analysis and dermal exposure model approach.

Commented on a Monte Carlo analysis in a community exposure and risk assessment of airborne contaminants. Reviewed the appropriateness of using this probabilistic tool and the effectiveness of the analyses implemented.

Performed several consumer exposure assessments for businesses evaluating warning compliance under California Proposition 65. Consumer products evaluated have included an HVAC equipment line, retail shelving equipment, tarps and hardware, shoes, and a luxury furniture line. Exposures to metals (e.g., lead, hexavalent chromium), organic compounds (e.g., phthalates, 2-MBT, solvents), and particulates have been evaluated. For each defined consumer scenario, inhalation, dermal, direct ingestion, and hand-to-mouth pathways have been assessed qualitatively or quantitatively. Many exposure assessments have involved developing an analytical testing strategy for consumer product lines. Finally, when necessary, safe harbor levels (NSRL, MADL) have been derived using Proposition 65 guidance (e.g., 2-MBT, cumene, 1-BP).

For litigation, reviewed a Proposition 65 analysis of talc in a consumer product line. Strategically reviewed the assessment's quantitative exposure methods and assumptions and evaluated the appropriateness of these under Proposition 65.

Developed Proposition 65 risk assessments for multiple confidential product lines. Exposure pathways included inhalation, dermal contact, and ingestion via hand-to-mouth transfer. Also derived NRSLs and MADLs for chemicals that did not have State-defined values. Developed a user-friendly risk assessment tool in Excel that evaluated exposures and risks for various product types, consumer use, and chemical selection. The tool integrated several inhalation exposure models from AIHA IHMod.

Provided regulatory (REACH, Proposition 65) support to an international clothing company. Support has included a prospective assessment of DEHP in rubber shoe soles. Exposures and risk were estimated using Proposition 65 guidance and ECHA's ECETOC TRA model. Assisted the company in addressing a REACH violation of hexavalent chromium in a leather shoe product. Critically reviewed ECHA's risk assessment of hexavalent chromium in leather products, particularly the basis of the REACH restriction limit. As a result, performed an updated regulatory exposure assessment and toxicological evaluation.

Under the EU's REACH regulations, reviewed and synthesized data from literature relating to medium-chain chlorinated paraffins (MCCPs). Summarized the measured concentrations of MCCPs in various environmental media—sediment, soil, and biota—and critically evaluated the data set.

Estimated warehouse workers' exposures to irritants resulting from accidental scenarios. Used IHMod to model near-field/far-field exposures under several scenarios to re-create exposures and predict when exposures did not exceed identified health benchmarks.

Allocated the environmental liability of parties involved with a former battery manufacturing facility using historical data and information. Work included an assessment of allocation methods used previously for the site.

Estimated a child's potential exposure to chemicals in inks and adhesives through incidental oral contact. Conservative exposure scenarios included ingestion and saliva migration. The average daily intake of chemicals was determined to be negligible.

Managed an evaluation of the approach used to assess risks associated with a former manufactured gas plant (MGP) site in Australia. Used the results in mediation to determine the extent of remediation needed to reduce potential human and environmental health risks from the site. Specific areas of interest included the exposure scenarios and assumptions used in the assessment.

Evaluated historical effluent discharge from a former battery manufacturing facility. The assessment included a review of claims regarding the toxicology of the effluent and potential environmental exposures.

Member of a team conducting a human health risk assessment of metals in pond water and sediment. Developed a conceptual site model that included ingestion and dermal exposure to metals during recreational fishing, wading, and accidental immersion. Performed risk calculations for background levels of metals. Overall, concluded that no increased risk was associated with the exposures to pond water and sediment.

Participated in sampling California wines to compare arsenic levels in wine to human health criteria, including wine- and water-specific international and domestic arsenic health standards. The comparison factored in the differences in wine and water consumption rates.

Assisted in a human health risk assessment of potential inhalation exposures to chemicals during the remediation of former MGP sites. Performed air dispersion modeling to compare potential risks associated with remediation to fence-line concentration objectives calculated to protect nearby receptors.

Evaluated risk associated with ingestion of vegetable-based carbon black in lollipops. Researched international and domestic regulations pertaining to vegetable-based carbon black in food and the compound's toxicity from ingestion. Calculated exposures for the US population (children) and compared those values to estimated total dietary exposures to vegetable carbon black. Findings indicated no increased risk from ingestion of the carbon black in lollipops due to the lack of PAHs and low exposure levels.

Assisted in evaluating potential risk from PCBs in drinking water during multiple phases of remediation. Evaluated other sources of risk that included disinfection by-products and radium.

Completed an exposure assessment for long-chain chlorinated paraffins (LCCPs) manufactured in the United States. Reviewed air, water, landfill, and incineration emission factors and compiled data for use in the ECETOC Targeted Risk Assessment (TRA) model for compliance with REACH.

Performed a quality assurance review of extended safety data sheets (eSDSs) for four phosphates (DDPP, DPDP, 2-EHDPP, TDP). Verified the accuracy of predicted environmental concentrations and risk characterization ratios for multiple human health and environmental exposure scenarios.

Developed a tool that modeled lifetime asbestos exposures to create a threshold ranking distribution based on several inputs. A Monte Carlo simulation was incorporated in the model to assess the uncertainty in exposure intensity throughout a worker's career.

### **Statistical Analysis**

Cleaned a large database of PCB sampling measurements from a variety of environmental media. Supported litigation team by building summary statistics formulations for use in current and future matters.

Built a database that handled and cleaned large data sets of liquid and aerosol ENDS product testing results. Also created a framework for performing descriptive summary statistics on the results for use in human health risk assessments.

Helped evaluate a coal-ash facility's state regulatory compliance by conducting statistical analysis of groundwater data. Chemicals of concern included arsenic, boron, iron, manganese, selenium, thallium, and total dissolved solids. Analysis included various methods outlined in the USEPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance. Specifically, employed ProUCL and R to determine background concentrations and identify outliers, data distributions, and EPCs.

Reviewed and commented on OSHA's justification for current sampling and analytical methods used to measure respirable crystalline silica (RCS). Assessed the ability to accurately measure exposures at the proposed occupational permissible exposure limit (PEL) of 50 µg/m<sup>3</sup> and at a corresponding action level of 25 µg/m<sup>3</sup>. Work included an assessment of OSHA's comments in the Notice for Proposed Rulemaking for an Occupational Exposure to Crystalline Silica standard and Preliminary Economic Analysis, statistical analysis of available data in R, and a literature review of sampling and analytical methods for RCS.

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## COMPUTER AND LANGUAGE SKILLS

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AERMOD, AERSCREEN, SCREEN3, AIHA IHMod and SkinPerm, ECETOC TRA, Johnson and Ettinger, ChemSTEER, EpiSuite, ProUCL, BMDS, R

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## PUBLICATIONS

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Massarsky A, Donnell MT, Binczewski NR, Chan K, Dinh D, **Bare JL**, Unice KM. 2022. Methodology for exposure and health risk screening of phthalates potentially present in fabric face coverings. *Hum Ecol Risk Assess* 28:184–204.

Scott PK, Abramson MM, **Bare JL**, Barlow CA. 2019. Air dispersion modeling for historical community exposure reconstruction: An evaluation of the approach and its uncertainties. *EM-Mag Environ Mgrs*, January.

Drechsel DA, Barlow CA, **Bare JL**, Jacobs NF, Henshaw JL. 2017. Historical evolution of regulatory standards for occupational exposures to industrial talc. *Regul Toxicol Pharmacol* 91:251–267.

Pierce JS, Abelmann A, Lotter JT, Ruestow PS, Unice KM, Beckett EM, Fritz HA, **Bare JL**, Finley BL. 2016. An assessment of formaldehyde emissions from laminate flooring manufactured in China. *Regul Toxicol Pharmacol* 81:20–32.

Paustenbach DJ, Insley AL, Maskrey JR, **Bare JL**, Unice KM, Conrad VB, Iordanidis L, Reynolds DW, DiNatale KD, Monnot AD. 2016. Analysis of total arsenic content in California wines and comparison to various health risk criteria. *Am J Enol Viticult* 67(2):179–187.

Unice KM, **Bare JL**, Kreider ML, Panko JM. 2015. Experimental methodology for assessing the environmental fate of organic chemicals in polymer matrices using column leaching studies and OECD 308 water/sediment systems: Application to tire and road wear particles. *Sci Tot Environ* 533:476–487.

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## PRESENTATIONS AND POSTERS

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**Bare J**, Vivanco, S, Panko J. Example framework for chemical additive replacement prioritization in a circular economy for plastics: Human health perspective. Poster at Society of Environmental Toxicology and Chemistry (SETAC), Pittsburgh, PA, November 2022.

**Bare JL**, Maskrey JR, Hallett LA, Hamaji CM, Unice KM. 2019. Qualitative review of recent USEPA TSCA occupational inhalation exposure assessments: Recommendations for future assessments. Abstract P.122. Poster Presentation at Society for Risk Analysis (SRA) Annual Meeting, Arlington, VA, December 2019.

**Bare JL**, Novick RM, Maskrey JR, Unice KM. Screening air dispersion modeling approach: Prop 65 community exposure assessments for industrial emitters. Platform Presentation at Air and Waste Management Association's (AWMA) Annual Conference and Exhibition: Conference Proceedings, Quebec City, Quebec, June 2019.

Abramson MM, **Bare JL**, Barlow CA, Scott PK. 2018. Evaluation of the uncertainties associated with the use of air dispersion modeling to estimate historical community exposure from manufacturers of asbestos-containing

products. Platform Presentation at Air and Waste Management Association's (AWMA) Annual Conference and Exhibition: Conference Proceedings, Hartford, CT, June 2018.

McMenamy C, Jacobs N, **Bare JL**, Keenan JJ. 2018. Potential exposure to hydrogen fluoride from a thermal runaway event in an airplane cockpit. Abstract #653. Poster Presentation at American Industrial Hygiene Conference & Exposition (AIHce), Philadelphia, PA, May 2018.

**Bare JL**, Abramson MM, Maskrey JR, Manning CM, Keenan JJ. 2018. Proposition 65 risk assessment model framework for chemically-complex consumer products. Abstract #3525. Poster Presentation at Society of Toxicology (SOT) Annual Meeting, San Antonio, TX, March 2018.

**Bare JL**, Abramson MM, Barlow CA, Scott PK. 2017. Use of air dispersion modeling to estimate historical community exposure from manufacturers of asbestos-containing products. Abstract P.96. Poster Presentation at Society for Risk Analysis (SRA) Annual Meeting, Arlington, VA, December 2017.

Jacobs N, **Bare JL**, McMenamy C, Keenan JJ. 2017. Potential chemical exposures following thermal runaway in a lithium ion battery. Abstract #614. Poster Presentation at American Industrial Hygiene Conference & Exposition (AIHce), Seattle, WA, June 2017.

Hollins DM, Scott PK, **Bare JL**, Barlow CA, Nembhard M, Maskrey JR, Paustenbach DJ. 2017. Estimating asbestos emissions from former industrial sites and estimating resulting airborne concentrations in the surrounding community: A review of methodologies. Abstract #3248. Poster Presentation at Society of Toxicology (SOT) Annual Meeting, Baltimore, MD, March 2017.

Keenan JJ, **Bare JL**, McMenamy C, Chapman A, Miller E. 2017. Screening-level risk assessment of hydrogen fluoride exposure resulting from a thermal runaway event on an aircraft. Abstract #2829. Poster Presentation at Society of Toxicology (SOT) Annual Meeting, Baltimore, MD, March 2017.

Lotter J, Unice KM, Ruestow PS, Abelmann A, Fritz HA, Beckett E, **Bare JL**, Pierce JS. 2016. Formaldehyde emissions from small chamber testing of laminate flooring and comparison to exposure modeling. Podium Presentation at American Industrial Hygiene Conference & Exposition (AIHce), Baltimore, MD, May 2016.

Fritz HA, Lotter J, Abelmann A, Ruestow PS, Beckett E, Unice KM, **Bare JL**, Pierce JS. 2016. Evaluation of diurnal variations in formaldehyde concentrations following installation of laminate flooring using real-time sampling. Poster Presentation at American Industrial Hygiene Conference & Exposition (AIHce) Baltimore, MD, May 2016.

Pierce JS, Abelmann A, Ruestow P, Lotter J, Beckett E, Fritz HA, **Bare JL**, Unice KM. 2016. Assessment of indoor formaldehyde concentrations following the installation and removal of laminate flooring. Poster Presentation at American Industrial Hygiene Conference & Exposition (AIHce), Baltimore, MD, May 2016.

Ruestow PS, Unice KM, Lotter J, Abelmann A, Fritz HA, Beckett E, **Bare JL**, Pierce JS. 2016. Time trends in formaldehyde emissions from laminate flooring products after installation. Poster Presentation at American Industrial Hygiene Conference & Exposition (AIHce), Baltimore, MD, May 2016.

Pierce JS, Abelmann A, Ruestow PS, Lotter J, Beckett E, Fritz HA, **Bare JL**, Unice KM. 2016. Assessment of indoor formaldehyde concentrations following the installation and removal of laminate flooring. Abstract #1689. Poster Presentation at Society of Toxicology (SOT) Annual Meeting, New Orleans, LA, March 2016.

Unice KM, **Bare JL**, Kreider ML, Panko JM. 2015. Evaluation of leachate from tire and road wear particles (TRWP) upflow percolation column tests. Poster Presentation at Society of Environmental Toxicology and Chemistry (SETAC) North America 36th Annual Meeting, Salt Lake City, UT, November 2015.



# Alexander East, B.S.

SCIENTIST II

## CONTACT INFORMATION

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## PROFESSIONAL PROFILE

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Alexander East is an environmental scientist in ToxStrategies' Exposure Sciences Practice. He specializes in computational exposure, with a focus on population dynamics and residential scenarios, complemented by practical experience in both laboratory procedures and field work. Mr. East received a bachelor's degree in Environmental Policy and Management, participating in the university Honors Program and graduating with distinction in Environmental Studies. He has since worked in both a governmental regulatory agency (statistical analysis) and the private sector (laboratory setting). His skill set includes the use of R Package software (modeling, ggplot, package development), geographic information system (GIS) software, and data visualization and various laboratory analytical techniques.

## EDUCATION AND DEGREES EARNED

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2018 Bachelor of Science, University of North Carolina at Asheville  
Environmental Policy and Management (minors in Mathematics and Economics)

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**PROFESSIONAL ASSOCIATIONS**

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2022–Present   International Society of Exposure Science

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**SELECTED PROFESSIONAL EXPERIENCE**

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***Research Scientist***

Estimated exposures to PFOA and PFOS for American adults and children from dust, water, indoor and outdoor air, soil, and dietary intake (see published manuscript below).

Developed an R package to estimate concentrations from limited summary statistics and generate synthetic exposure curves for any chemical, individual, and medium.

Enhanced existing population model software by improving ease of use, runtime, and distribution for the Residential Population Generator (RPGen). Presented the benefits of RPGen and compared to SHEDS-HT in a published manuscript (see below).

Drove a systematic review of physiologically based pharmacokinetic (PBPK) models used for PFAS in literature, leveraging the R Package Bibliometrix to characterize change in the corpus of literature over time.

Presented posters at SOT 2022, SETAC 2020, and a symposium at ISES 2021 (see below).

***Laboratory Analyst***

Used polarized light microscopy (PLM) to analyze building materials using EPA Method 600 for the purpose of identifying asbestiform fibers at <1% mass or less at an NVLAP-accredited laboratory.

Performed point counts in low-percentage asbestos materials and analyzed heat-altered asbestos from 2019 California wildfires.

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**MANUSCRIPTS**

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**East A**, Dawson DE, Brady S, Vallero DA, Tormero-Velez R. 2023. A scoping assessment of implemented toxicokinetic models of per- and polyfluoro-alkyl substances, with a focus on one-compartment models. *Toxics* 11(2):163, <https://doi.org/10.3390/toxics11020163>.

**East A**, Egeghy PP, Cohen Hubal EA, Slover R, Vallero DA. 2021. Computational estimates of daily aggregate exposure to PFOA/PFOS from 2011 to 2017 using a basic intake model. *J Expos Sci Environ Epidemiol*, DOI:10.1038/s41370-021-00374-w, [open access online](#).

**East A**, Dawson D, Glen G, Isaacs K, Dionisio K, Price PS, et al. 2021. The Residential Population Generator (RPGen): Parameterization of residential, demographic, and physiological data to model intraindividual exposure, dose, and risk. *Toxics* 9(11):303, DOI: 10.3390/toxics9110303, [open access online](#).

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**ABSTRACTS AND PRESENTATIONS**

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**East, A**, Dalton C, Egeghy P, Vallero D. Estimating exposure across chemical, individual, and media using sparse summary statistics with the Lorber-Egeghy-East Method R Package. Poster presented at Society of Toxicology Annual Meeting, San Diego, CA, March 2022. DOI: 10.23645/epacomptox.20110814, open access online.

Tornero-Velez R, Dawson D, **East A**, Breen M, Brady S, Vallero D, Hubal EC, Wambaugh, J. Using systematic evidence mapping to track the development of toxicokinetic models of PFAS from 2000–2021. Poster presented at Society of Toxicology, San Diego, CA, March 2022, DOI: 10.23645/epacomptox.19333283, open access online.

Dalton C, **East A**, Price P, Vallero D. The role of product use scheduler for estimating exposure to methyl, ethyl, propyl, and butyl parabenzoic acid (parabens) within the Combined Human Exposure Model. Poster presented at Society of Toxicology, San Diego, CA, March 2022, DOI: 10.23645/epacomptox.1934935, open access online.

Fisher H, **East A**, Vallero D. Estimating longitudinal aggregate exposure — The third module of CHEM: Source to dose. Symposium presented at International Society of Exposure Science Annual Meeting, virtual conference, September 2021, DOI: 10.23645/epacomptox.16630675, open access online.

**East A**, Brady S, Isaacs K, Vallero D. The role of the Product Use Scheduler (PUS) in determining product use categories (PUCs) for owners and renters in the Combined Human Exposure Model (CHEM). Symposium presented at International Society of Exposure Science Annual Meeting, virtual conference, September 2021. DOI: 10.23645/epacomptox.16632271, open access online.

**East A**, Isaacs K, Vallero D. Application of the Residential Population Generator (RPGen) in prediction of exposure outcomes for owners and renters from consumer products using the Combined Human Exposure Model (CHEM). Symposium presented at International Society of Exposure Science Annual Meeting, virtual conference, September 2021, DOI: 10.23645/epacomptox.16632319, open access online.

**East A**, Price P, Dawson D, Glen G, Dionisio K, Isaacs K, Hubal EC, Vallero D. The Residential Population Generator (RPGen): Parameterization of residential, demographic, and physiological data to model intraindividual exposure, dose, and risk (presentation). Poster presented at Society of Environmental Toxicology and Chemistry North America 41st Annual Meeting, virtual conference, 2020, DOI: 10.23645/epacomptox.13476864, open access online.

Message

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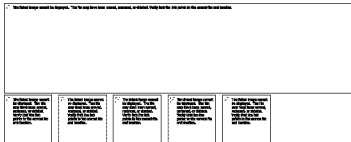
**From:** Cagle, Molly [molly.cagle@bakerbotts.com]  
**Sent:** 2/10/2023 8:05:47 PM  
**To:** Malone, George [Malone.George@epa.gov]  
**Subject:** RE: Final Revised ASAOC

Do we get some sort of prize for wrapping this up by Valentine's Day?

**Molly Cagle**  
*Senior Counsel*

Baker Botts L.L.P.  
[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)  
T +1.512-322-2535  
F +1.512-322-2501  
M +1.512-423-8552

401 S 1st St Suite 1300  
Austin, TX 78704



---

**From:** Malone, George <Malone.George@epa.gov>  
**Sent:** Friday, February 10, 2023 1:12 PM  
**To:** Cagle, Molly <molly.cagle@bakerbotts.com>  
**Cc:** Nicholas J. Bryan (NJbryan@up.com) <njbryan@up.com>; R. Ben Erica (erben@up.com) <erben@up.com>; Marsha Woodard <mkwoodar@up.com>; Seitz, Bart <bart.seitz@bakerbotts.com>; Smith, Marsha <marsha.smith@bakerbotts.com>; Lockett, Casey <Lockett.Casey@epa.gov>; Cuff, Angie <Cuff.Angie@epa.gov>  
**Subject:** RE: Final Revised ASAOC

[EXTERNAL EMAIL]

Molly,

I received the revised draft ASAOC forwarded by you yesterday. Consistent with the schedule to resolve this matter by no later than February 14, I plan to send you a Final Revised ASAOC representing the EPA's final offer in this matter today. I will be available to discuss the Final Revised ASAOC on Monday, February 13, from 9:00am – 10:00am or from 1:30pm – 2:30pm. Let me know what time works best for you. In addition, feel free to contact me in the office today at your convenience. Thank you – George

George Malone, III, Superfund Branch Manager  
Office of Regional Counsel  
U.S. Environmental Protection Agency, Region 6

(214) 665-8030

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---

**From:** Cagle, Molly <molly.cagle@bakerbotts.com>

**Sent:** Thursday, February 9, 2023 4:55 PM

**To:** Malone, George <Malone.George@epa.gov>; Cuff, Angie <Cuff.Angie@epa.gov>

**Cc:** Nicholas J. Bryan (NJbryan@up.com) <njbryan@up.com>; R. Ben Erica (erben@up.com) <erben@up.com>; Marsha Woodard <mkwoodar@up.com>; Seitz, Bart <bart.seitz@bakerbotts.com>; Smith, Marsha <marsha.smith@bakerbotts.com>

**Subject:** ASAOC UPPR markup

George and Angie,

I attach redline/strikeout comments to the draft ASAOC you sent on 2/6/23. I accepted all changes from your 2/6 draft and edited that with a few revisions for your consideration. As promised, we were light with our pencil—revisions requested for clarifications UP feels are very important this round. Once again, let Bart, Marsha Smith or me know if the attachment doesn't open correctly, or if there are glitches. Most of the edits are self-explanatory, but we did include a few comments for your consideration as well.

Please consider any paragraph without an edit as resolved. Also, there are a few paragraphs with grammatical edits only (see Para 34). Those also are resolved, but the grammar ought to be fixed for posterity. And there is a mis-reference (para 37) that needs to be fixed.

We are looking forward to your response on the attached, and the SOW.

As for scheduling and availability, my Friday is covered with "stuff", including a 1:30 meeting with a contractor who promises he can fix the roof damage from branch that fell in the ice storm. Monday is pretty open, but if we need to talk tomorrow, email Bart and me and we will find time for you.

Best, Molly

**Molly Cagle**

*Senior Counsel*

Baker Botts L.L.P.

[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)

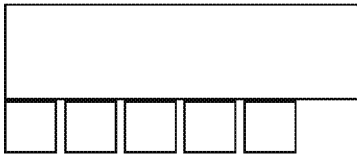
T +1.512-322-2535

F +1.512-322-2501

M +1.512-423-8552

401 S 1st St Suite 1300

Austin, TX 78704



---

**From:** Cagle, Molly  
**Sent:** Tuesday, January 31, 2023 3:52 PM  
**To:** Cuff, Angie <[Cuff.Angie@epa.gov](mailto:Cuff.Angie@epa.gov)>; Malone, George <[Malone.George@epa.gov](mailto:Malone.George@epa.gov)>  
**Cc:** Nicholas J. Bryan ([Njbryan@up.com](mailto:Njbryan@up.com)) <[njbryan@up.com](mailto:njbryan@up.com)>; R. Ben Erica ([erben@up.com](mailto:erben@up.com)) <[erben@up.com](mailto:erben@up.com)>; Smith, Marsha <[marsha.smith@bakerbotts.com](mailto:marsha.smith@bakerbotts.com)>; Seitz, Bart <[bart.seitz@bakerbotts.com](mailto:bart.seitz@bakerbotts.com)>  
**Subject:** Second Response by UPRR to EPA's General Notice Letter for the Houston Wood Preserving Works Site

Angie & George,

As promised below, I attach redline/strikeout comments to the draft ASAOC (as defined by my 2:08pm email). We are glad to sit down with you or set up a Teams meeting at your earliest convenience to review our proposed edits.

We also want to get started on the SOW. Our dioxin sampling plan is going to final review shortly, and we will submit to EPA as soon as the negotiating parties sign off. We have the data base ready, and are glad to review it with EPA at your earliest convenience. We made the same offer to TCEQ. Vapor Intrusion study design is underway, with a joint call later this week. Expect UP's technical experts to be in touch with Casey before week's end.

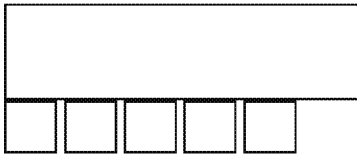
Please let Bart or me know if the attachment doesn't open correctly, or if there are glitches. Most of the edits are self-explanatory, but we did include a few comments for your consideration as well.

Thank you for your support for this important project.  
Best, Molly

**Molly Cagle**  
*Senior Counsel*

Baker Botts L.L.P.  
[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)  
T +1.512-322-2535  
F +1.512-322-2501  
M +1.512-423-8552

401 S 1st St Suite 1300  
Austin, TX 78704



---

**From:** Cagle, Molly  
**Sent:** Friday, January 27, 2023 3:31 PM  
**To:** Cuff, Angie <[Cuff.Angie@epa.gov](mailto:Cuff.Angie@epa.gov)>; Malone, George <[Malone.George@epa.gov](mailto:Malone.George@epa.gov)>  
**Cc:** Nicholas J. Bryan ([NJBryan@up.com](mailto:NJBryan@up.com)) <[njbryan@up.com](mailto:njbryan@up.com)>; Seitz, Bart <[bart.seitz@bakerbotts.com](mailto:bart.seitz@bakerbotts.com)>  
**Subject:** Response by UP to EPA's General Notice Letter for Union Pacific Railroad Company Houston Wood Preserving Works Site

Angie and George,

First, Angie—thanks for picking up my call after hours. Second, as I advised you both, Bart Seitz and I are representing Union Pacific (UP) in RCRA, and now CERCLA, matters associated with the former Houston Wood Preserving Works (HWPW). Third, this email confirms the substance of my conversation with Angie on this, the third calendar day after January 24th (the date of the UP General Notice Letter regarding the HWPW). Namely UP's willingness to:

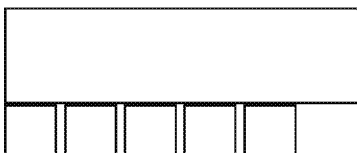
- (1) enter into negotiations for the performance of a Site Removal Evaluation;
- (2) provide redline/strikeout comments to the draft ASAOC (as defined by my 2:08pm email) by January 31; and
- (3) reach an agreement-in-principle concerning the proposed ASAOC within twenty-one (21) calendar days of January 24.

We look forward to working with you on this matter.

Best,  
Molly Cagle

**Molly Cagle**  
*Senior Counsel*

Baker Botts L.L.P.  
[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)  
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M +1.512-423-8552



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Message

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**From:** Garrett, Shellita [Garrett.Shellita@epa.gov]  
**Sent:** 2/28/2023 6:37:52 PM  
**To:** Malone, George [Malone.George@epa.gov]  
**Subject:** RE: UPRR ASAOC Effective Date Notification

You are welcome!

---

**From:** Malone, George <Malone.George@epa.gov>  
**Sent:** Tuesday, February 28, 2023 12:35 PM  
**To:** Garrett, Shellita <Garrett.Shellita@epa.gov>  
**Subject:** RE: UPRR ASAOC Effective Date Notification

Thanks so much Shellita!

---

**From:** Garrett, Shellita <Garrett.Shellita@epa.gov>  
**Sent:** Tuesday, February 28, 2023 12:34 PM  
**To:** Malone, George <Malone.George@epa.gov>  
**Subject:** RE: UPRR ASAOC Effective Date Notification

George,

I have placed into SEMS. I am working on getting the information needed to enter into ICIS.

Thank you 😊

---

**From:** Malone, George <Malone.George@epa.gov>  
**Sent:** Monday, February 27, 2023 12:30 PM  
**To:** Garrett, Shellita <Garrett.Shellita@epa.gov>  
**Subject:** FW: UPRR ASAOC Effective Date Notification

Hi Shellita,

Please make sure the email attached below, and the two attached documents are included in the SEMS files for the UPRR Site located in Houston, Texas. I will also start working on ICIS Forms as well. – George

George Malone, III, Superfund Branch Manager  
Office of Regional Counsel  
U.S. Environmental Protection Agency, Region 6  
(214) 665-8030

---

**From:** Malone, George  
**Sent:** Monday, February 27, 2023 8:17 AM  
**To:** [molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)  
**Cc:** Andrews, Suzanne (she/her/hers) <Andrews.Suzanne@epa.gov>; McGuire, James <McGuire.James@epa.gov>; Meyer, John <Meyer.John@epa.gov>; Price, Lisa <Price.Lisa@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>; Cuff, Angie <Cuff.Angie@epa.gov>; [kjpeterb@up.com](mailto:kjpeterb@up.com); Nicholas J. Bryan ([Njbryan@up.com](mailto:Njbryan@up.com)) <[njbryan@up.com](mailto:njbryan@up.com)>  
**Subject:** FW: UPRR ASAOC Effective Date Notification



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

REGION 6  
1201 ELM STREET, SUITE 500  
DALLAS, TEXAS 75270-2102

February 27, 2023

Ms. Molly Cagle, Esq,  
Baker Botts L.L.P.  
401 S. 1<sup>st</sup> Street, Suite 1300  
Austin, TX 78704

Ms. Cagle,

The purpose of this communication is to notify you and your client, the Union Pacific Railroad Company, that the final Administrative Settlement Agreement and Order on Consent (ASAOC) for Removal Action Evaluation, CERCLA Docket No. 06-02-23, is effective today. Consistent with Section XXV (Effective Date) of the ASAOC, the ASAOC is effective after EPA issues notice to the Respondent that the Superfund and Emergency Management Division (SEMD) Director has signed the ASAOC. The SEMD Director signed the ASAOC on February 24, 2023. The signed ASAOC and Statement of Work are attached to this email. Should you have any questions or concerns regarding this ASAOC effective date notification, feel free to contact me at your convenience.

/s/ George Malone, III  
George Malone, III, Superfund Branch Manager  
Office of Regional Counsel  
U.S. Environmental Protection Agency, Region 6  
1201 Elm St., Suite 500  
Dallas, TX 75270-2102  
214-665-8030

Message

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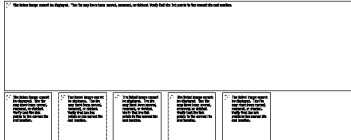
**From:** Cagle, Molly [molly.cagle@bakerbotts.com]  
**Sent:** 2/8/2023 10:38:47 PM  
**To:** Malone, George [Malone.George@epa.gov]  
**Subject:** FW: HWPW Confidential Settlement Communication  
**Attachments:** 02082023 UPRR clean revisions-SOW UPRR RSE.pdf

Done

**Molly Cagle**  
*Senior Counsel*

Baker Botts L.L.P.  
[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)  
T +1.512-322-2535  
F +1.512-322-2501  
M +1.512-423-8552

401 S 1st St Suite 1300  
Austin, TX 78704



---

**From:** Cagle, Molly  
**Sent:** Wednesday, February 8, 2023 3:57 PM  
**To:** Brian Amis <Brian.Amis@houstontx.gov>; Brian French <bfrenchelcs@earthlink.net>; Eric Bily <Eric.Bily@harriscountytexas.gov>; Jon Fombonne <Jonathan.Fombonne@harriscountytexas.gov>; Roy Rodney <rjr@rodneylaw.com>; Sarah Utley <Sarah.Utley@harriscountytexas.gov>; Suzanne Chauvin <Suzanne.Chauvin@houstontx.gov>; Timothy Wilkins <timothy.wilkins@bracewell.com>; jimb@supldes.com; Royeca, Gina Marie <gina.royeca@bakerbotts.com>  
**Cc:** Seitz, Bart <bart.seitz@bakerbotts.com>; Nicholas J. Bryan (NJBryan@up.com) <njbryan@up.com>; R. Ben Erica (erben@up.com) <erben@up.com>; Marsha Woodard <mkwoodar@up.com>  
**Subject:** HWPW Confidential Settlement Communication

Ladies and Gentlemen;

Reporting in about our negotiations with EPA regarding an ASAOC for the HWPW site. Thus far, UP satisfied all of the General Notice Letter deadlines, and we are hopeful that we will reach an agreement in principal shortly.

As part of our confidential settlement discussions with you, I am attaching the draft Statement of Work UP just submitted to EPA for the agency's review and consideration. Please note, this

is UPRR's version of the Statement of Work. EPA has not responded or agreed to UPRR's draft; the SOW is still under negotiation. The ASAOC discussions are nearly complete, but that too is still under negotiations.

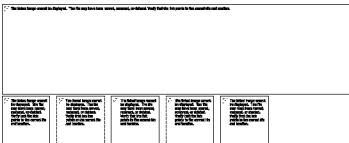
Let us know if you'd like a conference call to discuss the attached.

**Molly Cagle**

*Senior Counsel*

Baker Botts L.L.P.  
[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)  
T +1.512-322-2535  
F +1.512-322-2501  
M +1.512-423-8552

401 S 1st St Suite 1300  
Austin, TX 78704



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Message

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**From:** Malone, George [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=985B50A4D1444F2EBE9E9558315C4201-MALONE, GEORGE]  
**Sent:** 1/27/2023 7:43:08 PM  
**To:** Price, Lisa [Price.Lisa@epa.gov]  
**Subject:** FW: General Notice Letter for Union Pacific Railroad Company Houston Wood Preserving Works Superfund Site  
**Attachments:** UPRR GENERAL NOTICE LETTER.docx - 1-24-2023 Final (004)sdw.pdf; 01242023 SOW UPRR RSE Final Draft.pdf

---

**From:** Cuff, Angie <Cuff.Angie@epa.gov>  
**Sent:** Tuesday, January 24, 2023 5:54 PM  
**To:** molly.cagle@bakerbotts.com  
**Cc:** Malone, George <Malone.George@epa.gov>  
**Subject:** General Notice Letter for Union Pacific Railroad Company Houston Wood Preserving Works Superfund Site

Good afternoon Ms. Molly Cagle,

Please find the attached General Notice and Statement of Work for Union Pacific Railroad Company Houston Wood Preserving Works. A hard copy will be sent to you and C T Corporation System via certified mail. If you have any questions, please contact me via email or use the number listed in the attachment.

Thank you,

Angie Cuff  
Enforcement Officer  
U.S. EPA Region 6  
Superfund and Emergency Management Division (SEDAE)  
1201 Elm Street, Suite 500  
Dallas, Texas, 75270  
214-665-8134

Message

---

**From:** Malone, George [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=985B50A4D1444F2EBE9E9558315C4201-MALONE, GEORGE]  
**Sent:** 1/27/2023 7:28:19 PM  
**To:** molly.cagle@bakerbotts.com  
**Subject:** FW: General Notice Letter for Union Pacific Railroad Company Houston Wood Preserving Works Superfund Site

Casey Lockett Snyder  
EPA Region 6 Superfund Program  
214-665-7393  
[Lockett.casey@epa.gov](mailto:Lockett.casey@epa.gov)

---

**From:** Cagle, Molly <molly.cagle@bakerbotts.com>  
**Sent:** Friday, January 27, 2023 12:44 PM  
**To:** Cuff, Angie <Cuff.Angie@epa.gov>  
**Cc:** Malone, George <Malone.George@epa.gov>; Seitz, Bart <bart.seitz@bakerbotts.com>; Nicholas J. Bryan (NJBryan@up.com) <njbryan@up.com>  
**Subject:** RE: General Notice Letter for Union Pacific Railroad Company Houston Wood Preserving Works Superfund Site

Angie,

Can you please send the SOW in Word too?

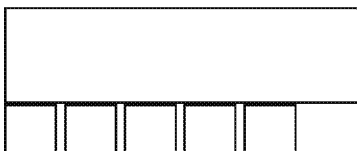
Your 7 day deadline is specifically for the ASAOC, and when I asked for the WORD document of same, you sent only the Order, none of the attachments. That suggests that you are not expecting the SOW in redline by the 7 day deadline. **IS THAT CORRECT?** The SOW does not match up various technical plans already negotiated with the City, County and BCI. Also, there are contradictions within the SOW, some requirements are based on outdated or erroneous information in part, etc. To revise the SOW, we need our technical folks to have a discussion. We are prepared to meet next week, or following submission of our redline of the draft Order.

I will call shortly to give you UP's 3-day response. We look forward to working with you on this.

Best, Molly

**Molly Cagle**  
*Senior Counsel*

Baker Botts L.L.P.  
[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)  
T +1.512-322-2535  
F +1.512-322-2501  
M +1.512-423-8552



---

**From:** Cuff, Angie <Cuff.Angie@epa.gov>

**Sent:** Tuesday, January 24, 2023 5:54 PM

**To:** Cagle, Molly <molly.cagle@bakerbotts.com>

**Cc:** Malone, George <Malone.George@epa.gov>

**Subject:** General Notice Letter for Union Pacific Railroad Company Houston Wood Preserving Works Superfund Site

[EXTERNAL EMAIL]

Good afternoon Ms. Molly Cagle,

Please find the attached General Notice and Statement of Work for Union Pacific Railroad Company Houston Wood Preserving Works. A hard copy will be sent to you and C T Corporation System via certified mail. If you have any questions, please contact me via email or use the number listed in the attachment.

Thank you,

Angie Cuff  
Enforcement Officer  
U.S. EPA Region 6  
Superfund and Emergency Management Division (SEDAE)  
1201 Elm Street, Suite 500  
Dallas, Texas, 75270  
214-665-8134

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Message

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**From:** Malone, George [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=985B50A4D1444F2EBE9E9558315C4201-MALONE, GEORGE]  
**Sent:** 2/6/2023 4:13:05 PM  
**To:** Cagle, Molly [molly.cagle@bakerbotts.com]  
**Subject:** RE: Request for 1pm documents, please  
**Attachments:** UPRR Removal AOC - EPA Revisions - 2-6-2023.docx; 7-Day UPRR Redline ASAOC (002).docx

Molly/Marsha,

Per your request, attached are the documents for today's meeting. – George

George Malone, III, Superfund Branch Manager  
Office of Regional Counsel  
U.S. Environmental Protection Agency, Region 6  
(214) 665-8030

---

**From:** Smith, Marsha <marsha.smith@bakerbotts.com> **On Behalf Of** Cagle, Molly  
**Sent:** Monday, February 6, 2023 10:02 AM  
**To:** Malone, George <Malone.George@epa.gov>  
**Subject:** Request for 1pm documents, please

Mr. Malone, is it possible to get a copy of the documents for the 1pm Teams Meeting today? I also left you a voice mail regarding same.

Thank you.

Marsha

---

**From:** Malone, George <Malone.George@epa.gov>  
**Sent:** Friday, February 3, 2023 3:01 PM  
**To:** Cagle, Molly <molly.cagle@bakerbotts.com>  
**Cc:** Cuff, Angie <Cuff.Angie@epa.gov>; Lockett, Casey <Lockett.Casey@epa.gov>; Seitz, Bart <bart.seitz@bakerbotts.com>  
**Subject:** RE: Good morning

[EXTERNAL EMAIL]

Molly,

1:00 pm is good. I'll send you a Teams invitation. – George

George Malone, III, Superfund Branch Manager  
Office of Regional Counsel  
U.S. Environmental Protection Agency, Region 6  
(214) 665-8030

---

**From:** Cagle, Molly <molly.cagle@bakerbotts.com>  
**Sent:** Friday, February 3, 2023 2:21 PM  
**To:** Malone, George <Malone.George@epa.gov>



**Cc:** Cuff, Angie <[Cuff.Angie@epa.gov](mailto:Cuff.Angie@epa.gov)>; Luckett, Casey <[Luckett.Casey@epa.gov](mailto:Luckett.Casey@epa.gov)>; Seitz, Bart <[bart.seitz@bakerbotts.com](mailto:bart.seitz@bakerbotts.com)>

**Subject:** Re: Good morning

How about 1 pm?

Sent from my iPhone

On Feb 3, 2023, at 10:13 AM, Malone, George <[Malone.George@epa.gov](mailto:Malone.George@epa.gov)> wrote:

[EXTERNAL EMAIL]

Good Morning Molly,

I saw the damage in Austin and lack of power on the news. I hope those issues are resolved ASAP!

I look forward to talking with you on Monday. Just let me know what times are good for you. I am available from 9:00 – 9:30am, 12:15 – 2:15pm, and after 3:45pm. – George

George Malone, III, Superfund Branch Manager  
Office of Regional Counsel  
U.S. Environmental Protection Agency, Region 6  
(214) 665-8030

---

**From:** Cagle, Molly <[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)>

**Sent:** Friday, February 3, 2023 10:00 AM

**To:** Malone, George <[Malone.George@epa.gov](mailto:Malone.George@epa.gov)>

**Cc:** Cuff, Angie <[Cuff.Angie@epa.gov](mailto:Cuff.Angie@epa.gov)>; Luckett, Casey <[Luckett.Casey@epa.gov](mailto:Luckett.Casey@epa.gov)>; Seitz, Bart <[bart.seitz@bakerbotts.com](mailto:bart.seitz@bakerbotts.com)>

**Subject:** Re: Good morning

George,

Goodmorning.

Still no power in Austin. Sigh.

And we are juggling power adapters (my husband also is a lawyer), and working from the RV parked in the driveway. It's actually fun-in a Beverly Hillbilly sort of way.

Your schedule looks good, but I would like to talk before you send us a draft. You can tell us what we altered that you hate and that we can start thinking immediately about what we can state differently to address your reaction. So maybe talk on the 6th? The City of Austin swears power will be restored by 6 PM today, so i should be in workibg order Monday.

Thanks, Molly

Sent from my iPhone

On Feb 2, 2023, at 11:29 AM, Malone, George <[Malone.George@epa.gov](mailto:Malone.George@epa.gov)> wrote:

[EXTERNAL EMAIL]

Molly,

Sorry about the misfortune, and I hope you are good considering the circumstances. I planned on calling you this Friday to discuss how to proceed with the UPRR draft ASAOOC discussions. This is my proposed path forward.

1. Feb. 3, 2023 – EPA (me) will call you to discuss the path forward for draft ASAOOC discussions.
2. Feb. 7, 2023 – EPA forwards you a revised draft ASAOOC after EPA reviews and comments on UPRR's proposed revisions.
3. Feb. 8 or 9, 2023 – Conduct a Teams call to discuss the revised draft ASAOOC; specify the Paragraphs in the revised draft ASAOOC that we agree on; discuss the revised draft ASAOOC Paragraphs without an agreement, and attempt to reach an agreement on these outstanding Paragraphs.
4. Feb. 10, 2023 – EPA forwards you revised draft ASAOOC considering Feb. 8 or 9 discussions.
5. February 13 or 14 – Conduct a Teams call to discuss the final draft ASAOOC, and reach an agreement-in-principle.

Let me know if the above proposal works for you. Thank you. Keep safe and warm. - George

George Malone, III, Superfund Branch Manager  
Office of Regional Counsel  
U.S. Environmental Protection Agency, Region 6  
(214) 665-8030

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**From:** Cagle, Molly <[molly.cagle@bakerbotts.com](mailto:molly.cagle@bakerbotts.com)>  
**Sent:** Thursday, February 2, 2023 10:22 AM  
**To:** Malone, George <[Malone.George@epa.gov](mailto:Malone.George@epa.gov)>; Cuff, Angie <[Cuff.Angie@epa.gov](mailto:Cuff.Angie@epa.gov)>  
**Subject:** Good morning

Day 2 without power. We wont be in touch today. Probably just as well, as I didnt have my coffee. Hope you guys are good.

<image001.jpg>

<image002.jpg>

Sent from my iPhone

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